The New Anthropocentrism

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The end of anthropocentrism is one of the signature achievements of science. Starting with Copernicus, we have progressively shifted the center of the Universe away from human beings. Now we are just another species in yet another planet in yet another Solar System in yet another galaxy (not yet another Universe, though that might happen too). Human beings are no more than one object among an infinite array of non-human objects. When it comes to subjectivity, the same logic leads us in exactly the opposite direction. As Descartes pointed out, the push towards objectivity is mirrored by a push towards certainty, which leads us inexorably towards cogito ergo sum. In other words, the totally objective Universe is mirrored and represented in my completely isolated and subjective consciousness. There is a dialectical relationship between objectivity and subjectivity. The more we dethrone anthropocentrism in the name of objectivity, the more we introduce subjectivity through the back door via consciousness and first person experience. Consequently, the mind sciences suffer from trying to reconcile subjectivity with objectivity while our conceptual framework prevents us from doing so. I think it is time to reintroduce a common-sense anthropocentrism. For one, it is obvious that I view the world through my eyes, not someone else's. The best we can obtain in terms of objectivity is positional objectivity; i.e., the maximally objective position from where

I am. Secondly, our embodied knowledge systems—as opposed to the abstract Cartesian one—are designed to know the world here and now. In my presentation, I will suggest an approach to the human world that is dialectical in the Madhyamika or Advaitic sense of that term, and shows how the interdependence of the subject and the object leads us towards a solution to some of the vexing questions in the mind sciences.

Rajesh Kasturirangan: Thank you very much for giving me this opportunity. It's a wonderful experience to be here and to listen to the various talks and, as David has already mentioned, these topics are so huge we could spend the next 500 years just sitting here discussing them—but we don't have that much time.

What I am going to try to do is to bring up some of the connections that come between mind, consciousness and the world that living organisms occupy, but from a very different perspective.

The first thing I want to say is that there are two kinds of scientists; people become scientists for two reasons. One kind builds labs in their basement and tries to blow up houses using test tubes, right? Another becomes a scientist because they read a lot of science fiction and want "to go where no one has gone before." I come into the latter category of scientist; I don't think I've ever tried blowing anything up as far as I know.

I want to begin with reference to a very good short novel by Arthur C. Clark called *The City and The Stars*. It is set in another *Yuga*, to use an Indian term, hundreds of millions of years in the future. The protagonist is trying to figure out what has happened, why the Earth is the way it is, and what he's eventually told is that human beings had evolved to such a point that they had managed to travel into space. They went very far away and somewhere at the outer limits of the cosmos they met intelligence so superior to themselves that they decided to return to Earth and work on themselves for a hundred

million years before they felt they would be ready to face this superior intelligence. This is a great theme because this conference is about cosmology and consciousness. It's not surprising that as we reach the outer limits of the cosmos it makes us want to examine our own selves and find out whether we really have the capacity to understand what the cosmos is. When I say in my title "The New Anthropocentrism," I mean that at some point we have to examine who we are in order to really understand what the cosmos is. And it's not that easy, it's actually very hard to understand who we are.

The modern scientific perspective is that we are not really special. There are 43 orders of magnitude, and we are right in the middle somewhere: we are approximately as small when compared to the Universe, as we are large compared to quarks. We are not special. We are simply not that great as far as the Universe is concerned, or that's the standard story. But that's a very objective perspective in a world where quarks are objects, bacteria are objects, galaxies are objects, and we are very ordinary objects. But in the sciences, it's clear that we are very special subjects because we are the only species, as was mentioned earlier today, too, that seeks to understand all these objects. On Earth, at least, we are the only species that wants to build space ships, that cares about UFOs. Strangely enough, if you explore the world of objects very carefully you seem to come back to the world of subjects, and in the world of subjects we become more special than we should be. And so there is this strange tension between saying that we are extremely ordinary objects and that we are very special subjects. That dialectic is the one that I want to explore.

This is a problem that runs throughout the history of modern philosophy and mathematics, and the theoretical sciences in many ways. The sciences that involve going out and collecting data and having faith in the data also have a very strong philosophical and theoretical history, and mathematics, in particular, a hand maiden of the sciences on the theoretical side, but not so much on the experimental side.

I'm going to start with the discussion of the specialness of subjects

going back to the first early modern philosopher, Rene Descartes, who was both a mathematician and a philosopher. Descartes was a Frenchman, but in those days if you had interesting ideas, France was not necessarily the best place to live, so he fled to Holland. Holland was cold, like here, and so he spent his days hidden inside a wooden stove. It wasn't burning, but that was the only warm place in his building, so he would hide himself inside the wooden stove and think these thoughts. I have a feeling that some of his philosophy took the shape that it did because he was hiding inside this wooden stove. But his point was very interesting: he said that he wanted to be a scientist, and wanted to base science on the most certain knowledge that you can get, because if you want objective knowledge, you want it to be certain. He also said that in order for all science to be certain, we have to start from the most certain thing that is possible. What is the most certain thing that is possible? Is it certain that there is a car outside on the road? Maybe there is, or there isn't, right? If you hear something honking, do you know it's a car? Maybe it's a car, or it's some kid playing with a toy car that makes the same sound. He carries this argument further and further, and says "I can never be certain about anything outside because," and this was a very Christian way of putting it, "maybe a devil is really manipulating what's being seen by me," so that instead of me seeing that there is a car outside, it's really a devil who is doing it. Anyone who has seen the movie *The Matrix* will understand this particular analogy. Descartes says, "I can therefore not be certain of anything objective outside." Thus, he starts by trying to find signs of objective reality in the most certain ways possible and he actually finds out that nothing objective can be certain. Instead, the one thing that you can be absolutely certain of is your own consciousness. He says, "I think therefore I am," which is to say that it's my experience, or my own consciousness, of which I am certain. My consciousness can be mistaken, I might be experiencing a car, but it could actually be a bird, or a plane, or superman, or whatever. But what you can always be certain of is that you are experiencing something—whether you are in a dream, whether you are awake. The fact that you are experiencing is the one certainty that you have and nobody can take that away from

you. Somebody can tell you that you are experiencing a bird when you think you are experiencing a plane. But nobody can tell you that your experience is not that of a plane, because your experience is your own. It's the one most certain thing that you have.

That's the beginning of the modern investigation into knowledge, because knowledge and epistemology, another term that has been used today many times, is the foundation of science. If you cannot be sure of the methods by which you do your experiments, then it doesn't matter how many experiments you do. And the harder the problem, the more certain you have to be about the conclusions of your experiments. Take, for example, the question: Is there life on other planets? Or is there consciousness in bacteria? These problems require methods that are as certain as possible. Therefore the study of epistemology is central to addressing these questions, and the study of epistemology comes back to human knowledge and where we acquired it.

The one field where we think we are really certain, outside, of course, our subjective consciousness, is mathematics. 2+2 is 4, independent of whether it's me or you or anybody else doing the calculation. A lot of investigation in the modern philosophical disciplines has taken mathematics as the paradigm of a science that delivers certain results. Now mathematics has a problem: you can argue, what is 4? So, is 2+2 equal to 4? There is something that makes 2 and 2 into 4. Or is 2+2 equal to 4 because that's just the definition of 4? Is 4 nothing but 2 added two times? Are you simply redefining 4 into 2 and 2? These are questions that are of great philosophical interest, but they became of great scientific interest towards the end of the 19th century when philosophers and mathematicians started forming distinct disciplines and invented what we now call mathematical logic and the foundations of computer science. Mathematicians like Alan Turing and Kurt Godel started thinking of how a machine could do something like mathematics. You might think why would anybody want a machine to do something like mathematics? The reason is that if you think that human beings are also machines, as many scientists

do, that we are nothing but the movement of molecules in certain biochemically constrained ways in our brains and in our bodies, then there must be a mechanical way to explain how we are epistemological beings. Here is the big problem: if I say 2+2 is 5, you'll all shout I am wrong, but not because you moved one molecule against another. When a molecule hits another molecule it doesn't produce a right or wrong: there is nothing right or wrong about an atom moving around another atom; there is nothing right or wrong about a planet moving around a star. But there is definitely something right or wrong about reasoning and about ethics, about all the things that we as humans care about. How then do you get things right or wrong from machines? That's what makes mathematics such an interesting subject, because it's in mathematics that people first figured out how to reduce questions of right or wrong into questions that machines could potentially solve. The effects of this are all around us. All these machines that we use are based on Information Technology that at some point was founded on ideas of others who figured out how to manipulate information into machines. That's an important development of the 20th century. It's the mechanization of reasoning, of logic, which also has its limits.

One of the things we have discovered in the 20th century is that just as science has limits—in terms of asking the questions is life really different from physics or how can consciousness arise from matter—there are similar limits in logic or mathematics. Are there thoughts that can never be thought, are there problems that are intrinsically unsolvable, are there things that are impossible for us to think? These are questions that at some levels seem to be abstract, but they actually have led to some great developments. It turns out that most problems, in some quantifiable mathematical sense, if they can be posed, probably cannot be solved. There is a very famous theorem by Godel that says that any mathematical system that is more powerful than arithmetic has theorem that are true but cannot be proven. This is amazing. It means that it's true in some sense, but no amount of calculation or manipulation can prove that it's true. That's pretty amazing. This is a new development in the understanding of knowledge that comes from

mathematics, but then it moves in a direction that is more consistent with biology in the development of the mind sciences.

The mind sciences are very new, even newer than biology, and their biggest impulse came in the 1950s when people started to use computers to try and learn how to model how the mind works. What they found is that computation is a good way to try to find out how the mind works. Let me give you an example. In English, I can say, "I ran passed the door." I can then say, "I was wearing a brown dress when I ran passed the door," and "I was wearing a brown dress on a rainy Tuesday when I ran past the door." You can see how each sentence is embedded in another sentence, and this has a very mathematical structure. Yet anyone who speaks English knows that these sentences are grammatical. Intuitively, without thinking, you know that these sentences are grammatical. Somehow your mind works and my mind works in such a way that we produce these perfectly grammatical sentences, which have a very intricate complex structure that nobody ever taught us. In fact, I am almost certain that until five minutes ago not a single person in this room had heard the sentence, "I was wearing a brown dress on a rainy Tuesday when I ran past the door." The first time in your life you heard a sentence you figured out that it was grammatical without anybody ever teaching you. How is that possible? A very famous cognitive scientist, known as Noam Chomsky, made a hypothesis that the reason why you can figure out that all these sentences are grammatical is because your mind is made that way, that you have an innate capacity, which is mathematically describable, for modern language that is "hard wired." There's something genetically hard wired in you to think in certain ways, and those certain ways can be modeled using mathematical techniques, in particular, mathematical techniques that come from computer science. This was a very important development.

The next important development again came from using mathematics—how do we see the way we see? Remember we are

investigating knowledge and how human beings and other creatures acquire knowledge. One of the ways that we acquire knowledge, and in Buddhism in particular, is through perception, which is the foundation of knowledge. Buddhists are very skeptical of concepts being the source of knowledge, but perception is at the source of knowledge in all Buddhist traditions. How do we perceive? You open your eyes and you see three-dimensional objects. When I open my eyes here, I see lots of people wearing robes that are, sort of, maroon, or some maroon and some dark red. How do I do that? How do I see 3-D shapes? And why is this a puzzle? Let me give you three puzzles here; one is that the input to your visual system consists of two two-dimensional images onto your retina. But when you open your eyes you don't see two two-dimensional images, you see one three-dimensional perception. How does your mind convert two two-dimensional images into a three-dimensional perception? You might think, especially if you know some mathematics, that this is easy. All you are doing is taking two projections of one three-dimensional object and doing a reverse geometry, right? Anyone who has done technical drawing will know that you can have different projections of one object, and you can reconstruct the three-dimensional object from the projections. But it's not that easy when we are doing it as people. Why? Because when you are seeing the world, you are moving your head and your eyes all the time. Your eyes focus on a different location five times a second, right? But the world does not seem to be moving five times a second to you. Most of you have a very stable concept of the world, you perceive a stable world, even though your eyes are moving five times a second and your body is moving all the time. You are kneeling, you are getting up, you are raising your head, you are doing all these things and yet the world is not moving and you know that the world is stable. How do you extract the stability even though you don't actually get that as an input? Here is a very simple experiment you can do: stare straight and then move your eyes to the right, not your face, but your eyes to the right as much as possible. Do you see that the whole world has changed? Probably not, and yet there's not a single pixel on your retina that is getting the same input

that it was getting before. There is a 100% different input, and yet the output or perception that you feel is almost the same. This constancy, the fact that the world is constant in your perception and therefore in knowledge, which is what allows us to say that we have some kind of reliable knowledge of the world, exists despite the absolute dynamic instability of the input to your senses. This is a very difficult problem to understand and it's been almost impossible to solve using computers. We now have a computer that can play chess better than any person, right? Maybe Gary Kasper is the only person in the world who can defeat Deep Blue, but tomorrow I am sure there will be a computer better than him.

And yet there's not a single computer in the world that can go around a room and grab an object when asked. For example, if I tell a computer, "Go around the room and collect all the water that has been left by people in this room," it can't do it. If you tell any person to, they can do it, but a computer cannot. Why? Because there will be water that will be left in mugs, there will be water that will be left in cans, there will be water that will be left in bottles, and there is no computer which can recognize that all these are receptacles of water. Here is another thing that we do very easily and which we cannot get a computer to do: I left this bottle over here and immediately I know that the bottle is not on the table anymore. I don't need to think, I automatically know, but a computer doesn't work that way. In fact, copy and paste is one of the greatest things our computers can do. You can have two copies of the same object, but in our real world its ontology does not allow you to copy and paste. Maybe some future quantum computing will help us do that, but right now we don't have that capability. The kind of furniture of the Universe that we as human beings are completely used to, and that we believe makes the world work, is something that's extremely hard for us to understand.

This is a hard problem that's different from the hard problems of physics and the hard problems of biology, because it's trying to understand why is it that our world is experienced by us in the way that it is. It's not an objective world and it's not a subjective world, it's

somewhere in the middle. It's a little bit like money; money is both subjective and objective. Unless I am the Federal Reserve, or a similar body, I cannot just print money. It's really there, you make a salary every month, and that's how much money you get. It's not in your head; it's out there in the world. And yet without human beings there's no such thing as money. Money is a human construct that requires creatures like human beings to be there for it to exist. The study of things that exist, in an interdependent sense, to use a Buddhist term, not things that exist outside human beings or outside living things, but things that exist because there are living things and because there are human beings, is a whole new world of study that is just opening up. It's the study that cognitive scientists do, and the study that we would like to do for other creatures.

The famous philosopher, Thomas Nagel, wrote a paper called "What is it like to be a bat?" Nagel said that human being are visual creatures, we learn about the world primarily through vision, but bats are not visual creatures. Bats live in caves where there is almost no light and they use sound to navigate the world. Nagel's basic conjecture was that there is simply no way for us, as human beings, to understand what is it like to be a creature that figures out the shape of an object using sound rather than vision. For us, the shape of an object is what you see, but what does it mean to see using sound? We have no idea, and therefore what Nagel says is that it is impossible for us to get into the mind of a bat. This goes back to Descartes. Descartes basically says, "I can only be certain of my own consciousness, someone else's consciousness I have no idea about." Nagel takes up that idea and transplants it into other species. We may know what other human beings are doing, but we may never know what a creature that is different, such as a bat, would ever do. And I cannot even think about an octopus, which has eight brains, it might be too different from us to ever really know. But as scientists, again in the *Star Trek* mold, we have a great opportunity to move into certain spaces that we have never gone into before, not spaces as in different stars or different planets, but into the life worlds of other species.

Maybe being a bat is very hard for us to understand. But maybe it's not possible for us to even understand what it is like to be a Rhesus Macaque. Macaques are monkeys that are not very different from us. They are also social creatures. They are also visual creatures. Maybe the way to make scientific progress on these kinds of questions is to go from how human beings think to how other primates think, and from how primates think to how other mammals think, and then perhaps, all the way to bacteria. Once we get there, my very wild conjuncture is that if we really want to figure out how life is going to be on other planets, we first have to figure out what is it like to be another creature on our planet. I say that because bacteria actually are very different from us. But we are also interrelated. So creatures that are simultaneously alien, and yet similar, but are on this planet, are a lot easier to study than potentially existent creatures on other planets. One thing I think astrobiologists should do is to study creatures that are rather different from us. Maybe we need to invent something like a mind-scope, like a telescope, and use radio astronomy to help us get into other planets in terms of physical characteristics. We need to start building devices that get us into the world of other species. I don't think it's impossible.

Here is a thought experiment that we can run: Imagine that you put a camera on a bird and let it fly around, and hook the output of that camera into your systems, so instead of me seeing what I normally see, I spend three days just seeing what the bird is seeing. I don't know if our nervous system is plastic enough to shift its register from seeing my human world to seeing the world of another species. We haven't done it, but the technology is available so it should not be that hard for us to start building these kinds of mind-scopes, and once we start doing that and collecting the data, it might turn out that there are some things about other species that are very, very hard for us to understand and some things about other species that are very easy for us to grasp. Just as it turns out that building machines for playing chess is easy, or easy enough, but building machines that can pick-up and collect objects is very hard. It's not clear to me what bats do that

is hard, and what it is that bats do that is easy.

I am excited about the relationships between the contemplative traditions and science—and Buddhism is the one with the closest relationship with science—because these traditions have a very rich taxonomy and theorization of experience. Science and psychology have a very strong desire to understand experience, but don't have a very good theoretical grasp on the different mental states and the different perceptual states, the different emotional states, that are found in Buddhism. If you read Buddhist texts you will see a rich vocabulary there; science doesn't have that. My point is that vocabulary is exactly what we need to really get beyond the naïve anthropocentrism that we have in the cognitive sciences. When I say naïve anthropocentrism, I mean accepting our experience is a given. No self-respecting contemplative would accept ordinary experience as given. It's one of the tasks of any contemplative tradition to probe experience and discover an organism's organizing levels, higher or lower kinds of experience, subtle or gross kinds of experiences. These are things that scientists currently don't think about so much. But once we start considering the theoretical and experimental distinctions, we can start understanding how human experience works and from there begin to understand how non-human experience works. Maybe it isn't too far down the road, maybe 100 years, when it won't be impossible for us to experience what it's like to be a bat, or maybe even an octopus. I don't know, but that's my *Star Trek* moment. If, instead of going into outer space, we can go into the life worlds of other species and use that to probe what it would be like to be hypothetical creatures, since we don't right now have the evidence, then we have real science happening.