

Interviewee: Professor Nayef Al-Rodhan, neurophilosopher

Interviewer: Zan Boag

Living in space



Zan Boag: As we gaze up into the night sky and look into this vastness, this darkness, we see sparkles of light from another place. When we think of everything that exists, all of space, it is very difficult for us to fathom. What is space? Is it limitless?

Professor Nayef Al-Rodhan: The short answer to that is we have no clue. What I think we will require, and I think there's a lot of debates in the literature about that, is that we require new laws of physics to be able to understand these very complex ideas. I think the known universe is daunting, and the exact nature of the unknown

universe is beyond our current comprehension. It is probably limitless. A lot of theories talk about space expanding at various rates, and the question is, expanding into what?

The Hubble telescope was revolutionary, and what will be even more revolutionary is the James Webb telescope when it is launched later this year. We will be able to see farther and gain many more insights, but we have a long way to go before we even have a rudimentary understanding of the nature of outer space. And of course, what fascinates people... I think what fascinates me is whether there are Earth-like planets out there, with or without biological entities that may resemble us or be completely different from what we imagine a biological entity would be.

It seems extraordinary that we could be alone; that we could be the only life that exists in the universe. If there is this

absolutely limitless universe, the odds seem too great for us to be alone.

I think it's impossible that we're alone. And they've estimated – NASA and some astrobiologists – that there may be millions of Earth-like planets at least in our galaxy. And there's a lot of work where people have found oxygen and water, which is what earthlings think are required for life. There's also evidence that other organisms can live completely on hydrogen or hydrogen products, or even completely different and unknown requirements for survival. It is highly likely that there are various life forms out there. They may be completely different from us, but not necessarily less intelligent or less capable. That's all speculation, but I think it's reasonable to speculate along those lines, given the vastness and apparent limitless nature of the universe.

One of the driving factors behind space exploration is this idea that there



may be something else out there. Now we have technology that allows us to travel vast distances. There are plans to colonise the Moon by 2024, to send humans to Mars in the next 20 years. Why are we extending our reach beyond Earth's boundaries?

The motivation for this is manifold. Lord Rees, the Astronomer Royal at Cambridge and Stephen Hawking, when he was alive, advocated that it is in the long-term interest of our species to find other habitable worlds. This is to ensure our survival should something catastrophic happen to Earth, whether it's super volcanoes, a comet, or whatever, and we need to spread out to maintain our place in the universe. This is a very interesting point of view, and I subscribe to that, because I think we are so vulnerable. It is estimated that 97 per cent of all species that have ever existed on Earth have become extinct, and humanity may be no different.

I think our extinction on this planet is probable at some point, for all kinds of reasons. The other reason, of course, is the spirit of exploration, innovation, and national competition for hegemony, economics, resources, and power. President Johnson in 1967 said whoever controlled space controlled global affairs. And I think he was right.

Once you have power, you have conflict. And this is one of the issues that we're going to face with attempts to colonise Mars. I know that you wrote that under that 1967 Outer Space Treaty, Mars belongs to everyone, nobody can

own a celestial body. So what issues are we going to face as states, companies, and private individuals race to set up these colonies, whether it be on the Moon or on Mars, or whether it's mining asteroids; what sort of problems are we going to face?

I think, as you mentioned, the 1967 treaty prohibits the appropriation of any celestial body. But nobody who participated in drafting that treaty imagined that in their lifetime that would be an issue; that was such a remote possibility. There's a lot of reluctance on the part of major space powers to really sit down and negotiate a code of conduct because some have such a profound technological superiority that they think they don't need to. I think this is short-sighted.

The answer to your question is that we'll face a lot of problems. We'll face competition and possibly conflict as well. The four major space superpowers – the US, China, Russia and the EU – think that the place is so big that the likelihood of people crowding each other and getting into trouble and conflict is minuscule at this stage. So, they want to maximise their gains for now and not commit themselves to any treaties or legal frameworks. And then whenever people catch up with them, they'll say, "OK, now we'll sit down and negotiate." I think that's the approach.

Whenever humans enter a new territory there is a strong element of risk involved. It is impossible to say how any nation will handle a future colony on the Moon, on Mars or an

asteroid, but it is easy to imagine that some of the difficulties that explorers faced in human history might recur in the future.

Part of the issue is the lack of a clear legal status around space colonisation and permissible and non-conflictual activities. In the past, when a new territory has been discovered, nations competed for that territory rather than agreeing to piece it out between each other in a fair manner. Would this change with Mars or other celestial bodies? Would every nation on Earth have a right to territory in space, or would property be determined by nations with superior scientific and economic power to acquire it? These questions are, in the short-term, unanswerable, but we have to answer them, or rather decide what the answers should be, before human colonisation of celestial bodies occurs, and decide what form of governance pioneering nations and groups should adopt.

There are a lot of issues in the creation of a utopia, that we can create the perfect or the ideal place somewhere else. Often it's to avoid dealing with any issues that we may already have. There are a lot of problems that we face on Earth. Is the hunt for utopia elsewhere just a way of pushing all that aside? That we'll find another world, we'll make a better world?

Yes. I think that's a dreamy enterprise. However, I think whatever we do elsewhere will be an extension of our successes and failures here on Earth.

There's a lot of reluctance on the part of major space powers to really sit down and negotiate a code of conduct.

We are who we are, as I've written before, we are "emotional amoral egoists", and our moral compass is governed for most of us, most of the time by what I call "perceived emotional self-interest". And perception is critical because we can perceive incorrectly and undermine our intended self-interest. I think in our current biological form we are not necessarily cooperative creatures.

Most of us, most of the time, cooperate because it suits our short-term perceived emotional self-interest, and the reason accountable societies have succeeded somewhat more than others is because they've created accountable, transparent, and independent institutions that actually reassure our vulnerable and frail human nature about the dangers of a Hobbesian state of nature. Regrettably, reason, morality, and reflection are not as ubiquitous as we would like to think, but that is not what most of us are capable of, at least most of the time.

Hobbes was of course a product of the English Civil War. But everything he said was correct and applies to any place even today, where anarchy and the state of nature dominate.

The only reason most of us are not in a Hobbesian world today is because of accountable institutions that keep us civil towards each other, with laws that govern our interactions.

Historically, prior to the concept of the State with defined borders, it was religions that did this on an ad hoc and diffuse basis, but now rules and institutions – religious or otherwise – do so in a more structured and accountable way, governing humanity's predilection for conflictual competition.

So, I think there are a lot of challenges: political, economic, and philosophical. Because there are challenges to space travel, we will have solutions, but the problem is that these solutions will then raise further challenges that I don't think we're equipped to deal with.

It is very much the case that moving into outer space will not fix many of the fundamental issues that we face on Earth. The activities of most nations today in outer space do not seem to me to be an attempt to create a new society or a new world, but rather an attempt to extend existing practices of hegemony and national interests into a new territory.

We are far more likely to see an American Mars, a Chinese Mars, a Russian Mars, etc., than we are to see a utopian society shorn of earthly concerns or shortcomings. This is, in many ways, the problem with current outer-space activity. We lack enforceable legal frameworks that prevent international conflict on Earth, so there is every reason to expect us to lack one in space.

You write that where once outer space was considered a global commons, the recent development by the world's major powers of weaponised satellites and anti-satellites suggests a growing recognition that space may become more than just the battleground of a few entrepreneurs. What do you see as the greatest threat when it comes to property rights in space? And is there a solution to this?

The short answer is there is no current agreeable or enforceable solution. Outer space was always thought of as a global commons until sophisticated technological capabilities were developed and states became more ambitious as a result.

Many countries have created space forces during the past year, and NATO declared space a potential war domain. This was the first designation, even by people who had space forces; they had space forces, but they didn't talk about the intent or the expectation to fight a war out there, although that was a given and implicit in creating a space force. So, I think it is no longer a true or functional global commons anymore.

Long-term, the greatest threat is that a nation claims a piece of territory

and then uses its military to defend it. But in the short-term the danger is that space becomes congested further with space debris and increased militarisation where nations house weaponised satellites and use them on each other in space and/or on Earth. Collective efforts are therefore urgent to stop further militarisation of outer space and to de-clutter Earth orbits from increasing space debris. This will require enormous financial and technological resources that everyone must contribute to.

Humanity is becoming increasingly and irreversibly dependent on space in peace and war and for our daily needs and activities, from commercial travel, mobile telephones, the internet, etc., and therefore any serious disruption to orbital activities will be detrimental to all of us and may set humanity's progress back by many decades.

Property ownership in outer space is codified by the 1967 treaty, but it is likely that powerful nations are not going to abide by that. They're going to do what they need to do. So, I think we're in a bit of a mess and it may get messier in the absence of new regulatory frameworks.

You say that space is becoming increasingly important to us here on Earth in so many ways – that space is a critical asset for the modern state and the challenges it faces. How are cybersecurity and space security linked?

Well, they're all remote events. Access to space assets can only happen through cyber, that's the only way because there's no linkage. So, they are by definition linked. The problem is in any distance for connectivity, it's hackable, it's hijackable, and you can spoof it, you jam it, you can do all kinds of things. And this will potentially disrupt things and may inadvertently create an incident between the space powers that was unintentional and may result in a misunderstanding or conflict.

For us to go deep into space, you say that we're going to have to change our biological structure. There are long-term negative physiological effects from being in space: bones become brittle, sleeping and eating is difficult, muscles atrophy. Is it possible for humans to flourish in outer space?

The health issues that accompany space travel are well documented and will need to be addressed if humans are to spend long periods of time in outer space or in deep space on a space colony. The fact of the matter is we cannot predict all the issues that will accompany space pioneers, even if we can already see a range of issues, from anxiety and depression to cognitive decline, visual impairments, chromosomal changes, radiation sickness, and reduced bone density, and so on.

With every problem there will be an attempt to solve it, likely through bio-technological enhancement, which in turn will have its own side-effects that we may not be able to predict, as well as the obvious ethical and moral concerns of fairness,

authenticity, and meritocracy mentioned previously. That said, humans have adapted over time in most of the difficult situations they have found themselves in. The difference is that they had time over thousands of years, which we do not have in current our space plans; it is likely that we would only be able to survive long-term in outer space with the right molecular enhancements, because we are not going to survive in deep space in our current biological form.

What about cyberspace? Can we flourish in an online life?

From a neurobiological standpoint, we are not wired to be alone. We're not wired to be remote. And I actually wrote an article a few months ago when COVID started called the neurophilosophy of social isolation.

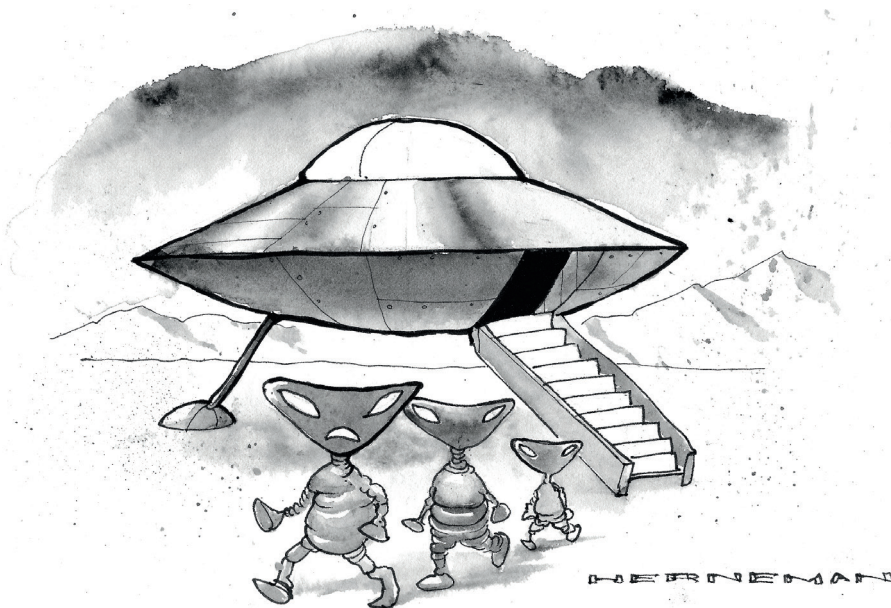
Social isolation is very troubling for the human mind. This is due to fear as a central motivator of our sense of wellbeing and security, as well as attachment and a sense of belonging. We will manage, we will exist,

but our psychodynamics will suffer. We may exist and function, but we are not going to be happy. Depression and anxiety and other mental illnesses, for example, have spiked in most societies during the current COVID crisis.

We do this out of necessity, but it's not really how we would like to function. Now we will adapt, we will deal it out of necessity, but our psychodynamics will suffer.

Is it possible for us to comprehend and measure the vastness of outer space?

Not any time soon. This will require greater technological insights than we currently possess. This will also require different scientific paradigms that may involve new laws of physics to understand the vast complexities of space and the space-time domain. How long this might take us or take our trans-humanist or post-humanist future forms, is hard to predict. The complexity of the known universe is daunting, and the unknown part of the universe will be unspeakably complex to understand and comprehend. ▣



“Everyone try to remember we’re parked in area 51.”



“Suddenly, from behind the rim of the Moon, in long, slow-motion moments of immense majesty, there emerges a sparkling blue and white jewel.”

Edgar Mitchell, astronaut

Image: *Earthrise reimagined*, Lunar Reconnaissance Orbiter Camera science team



Image: ESA astronaut Thomas Pesquet, 2020, by Robert Markowitz / NASA - Johnson Space Center



А) ПЕРИОДИЧЕСКИ ПРОВЕРЯЙТЕ
ВЕНТИЛЯТОР И НАСОС - ОТКЛЮЧИТЬ
ПЕРИОДИЧЕСКИ АВТОМ. ЕСЛИ АЛГОРИТМ
ЕСТЬ ПИТАНИЕ П
ДА ВЕНТИЛЯТОР И НАСОС
ВЫХОДЯТ
ПРОСЛУШАЙТЕ
НЕТ - ПЕРЕЙТИ НА «Б» ПРИ
ПОТЕРЕ ОСНОВНОГО
ВЕНТИЛЯТОРА И
СВЯЗЬТЕСЬ С
СВЯЗЬТЕСЬ С
Б) ПРИМЕНИТЕ ЗНАКИ РУКОМ
УБЕДИТЕСЬ, ЧТО ЕСТЬ ВЕНТИЛЯЦИЯ
ПРИМЕНИТЕ ИНДЕКСОР, ЕСЛИ НУЖНО
ЕСЛИ НЕТ СВЯЗИ, ПЕРЕЙТИ НА «Г»
ПРЕДУПРЕЖДЕНИЕ ИСПЫТАНИЯ П