

Race and Ethnicity hub:
Decolonising Computing

Syed Mustafa Ali:

SYED MUSTAFA ALI: Good afternoon, everyone. Thank you for joining this session. The title of the talk, as you can see on the slide, is Decolonizing Computing with a question mark. The idea of the question mark is to signal a certain ambivalence, possibly agnosticism on my part, regarding whether or not computing actually can be decolonized. There's a tendency, I would suggest nowadays, to assume that the idea of decolonizing can be applied to anything and everything. I'm less convinced by that, and I take the view that if you like phenomena need to be engaged with on an individual case by case basis, and the case needs to be made.

But that's not specifically what I'm going to try to do today. What I want to do is just sketch out what might be meant by a decolonial approach to computing, and whether or not it makes sense to think about computing as in some sense a colonial phenomenon, particularly given the fact that overt colonialism is something that has arguably ended, and that we now live in a so-called post-colonial age. I've given this talk a number of times, and for some people who are familiar with this project of mine, the decolonial computing project, some of this material might be familiar. But I've tried to give it a slightly different slant given that this presentation has been requested for Black History Month. So, let me drive straight in.

And how I want to go about engaging with this is looking at some examples of contemporary computing phenomena that arguably are entangled with some form of racist, if not anti-black and other forms of discriminatory phenomena. So, let's begin with some examples of anti-black computing. Possibly the first one that I've come across when I've been exploring this field historically was the Google Photos app which was about automatically tagging images and ended up tagging two black people, a black man and a black woman, as gorillas. This was perceived as in quotes "problem" and yet the problem remains. It has not yet had a fix, technical or otherwise.

As another example, we can think about something like face tracking software. So, this is software that's designed to track facial movements and essentially to follow the face of a person when they are in front of the camera. This was doing the rounds some years back and this goes back to Hewlett-Packard in the sense of the site of this problem. Two friends went

into a store, they were trying to interact with the face tracking software, a black male and a white female. The white female had her face tracked. The camera would move, the software would automatically adjust accordingly. The black male, no movement whatsoever. In other words, his face was simply incapable of being tracked. And we see this repeatedly, this particular problem if we want to consider it as a problem, repeatedly surfacing in relation to face recognition technologies, face tracking technologies, and even facial classification technologies.

Another example is smart soap dispensers. It can recognize white hands and it will dispense soap, but unfortunately black hands, no soap. More recent example, in relation to the Zoom Apple platform was the case of a black man attempting to give a presentation. The virtual background would simply amputate his head until he placed a pale, whitish globe behind, and then it was able to effectively bring him into focus. The point there being that his face is not recognized as a face.

We can also think about other apps including Grammarly, some people might be familiar with this app. And this recently appeared on Twitter, wherein a Black man had entered some text where he'd written an essay about black food history, and the natural language processing AI software associated with this particular app was flagging it up as angry because he was talking about Black food history in connection with black resistance and black joy, indicating some form of biasing within the way the app is classifying certain types of text. Again, I mentioned previously face recognition software. Here's another example, particularly disturbing. A black woman has to shine a bright light in her face during the entire two-day exam she's sitting in order that the ExamSoft remote monitoring technology doesn't flag her as a cheater.

And I think this is my final example of specifically anti-black computing technology, is again drawn from face recognition. And this appeared on the BBC News on the 7th of October this year, that the UK passport photo checker shows bias against dark skinned women. So, women with darker skin are more than twice as likely to be told their photos fail UK passport rules when they submit them online than lighter skinned men, according to this investigation. Now there are other examples of if you like, what we might call racist phenomena, including-- and again, this is a relatively recent one, which popped up in my Twitter feed-- Orientalism. So, and this is based on what we're drawing inspiration from the work of Safiya Noble of her important book, *Algorithms of Oppression*.

And this guy here, Dan Kotliar, he's an Israeli data scientist and scholar, a critical data scholar. He says that, following Safiya Noble's work when you search for Arab girl in Hebrew on Google Photos, you get pornography. Similar or the same happens for Ethiopian or Russian girl, but as he states, obviously this does not happen when you search for Arab boy,

nor for Jewish girl. And, sorry, one further example is from-- I think this was 2016 again on a Twitter platform. But this particular technology was embedded in the Twitter platform. It was the Microsoft chat board, Tay, which is an AI chat board. And very quickly it started to generate racist, sexist, and anti-Semitic genocidal tweets. It was shut down by Microsoft, but it raises a number of extremely important issues as to how and why the technology was generating tweets of this nature.

Now, one of the attempts at explaining this problem is couched in the language of bias. So, the argument is along the following lines, that you have an AI, an artificial intelligence, or machine learning, or deep learning, system it has a series of inputs and it generates a series of outputs. And the argument increasingly is that insofar as these technologies have to be trained on large data sets, then any historical bias embedded in those training data will percolate through the system and be reproduced in terms of the discriminatory pattern of results that it generates when it's being targeted at new examples of phenomena to either classify, or to recognize.

So, Kate Crawford who's I think part of the AI Now initiative. She actually wrote an interesting article a while back suggesting that artificial intelligence, machine learning, and deep learning systems, they suffer from what she calls the white guy problem. In other words, that there is a structural and systemic bias within the training data which results from the fact that the very people who tend to be developing these systems tend to be white males largely located in Silicon Valley, but also in similar places elsewhere located on the planet. So here it's really important for us to kind of draw attention to the idea of bias. And this being the centrepiece for most of the kind of critical work being done to try to address these various problems.

And this is really quite well engaged with in a series of books largely of a kind of popular science accessible nature. Probably commencing in 2016 with Cathy O'Neil's very intelligently and cleverly titled, *Weapons of Math Destruction*, looking at the issue of bias within big data and the implications of that for a variety of social phenomenon relating to recidivism that is the likelihood of people who likely to be construed as potential re-offenders in a criminal justice system, in court cases. Through to things like whether or not you're going to get a mortgage application approved, whether your insurance details are going to be engaged with in such a way that you might be screened out from consideration in a particular job opportunity, et cetera. This work was built on and complemented by Safiya Noble, who I mentioned previously in her book, *Algorithms of Oppression*.

Which is where she looked specifically at the Google search engine, and I gave you an example of how if you do a Google search in Israel in Hebrew on a particular term then it will correlate that term with a particular designation. In this case, that Arab girl connotes pornography, et cetera. And then similar other works included I think Virginia Eubank's

Automating Inequality whereby she trains the lens of class and economy on the question of a bias in data sets. And most recently in 2019 Ruha Benjamin's *Race After Technology*, which is not engaging exclusively with computing phenomena, but she cites a number of really very important cases of anti-Blackness within technology, including computer technology, some examples of which I've already presented.

And riffing off the idea of the Jim Crow laws in the American context, she coined this interesting turn of phrase the New Jim Code, which she refers to as the employment of new technologies that reflect and reproduce existing inequities but that are promoted and perceived as more objective or progressive than the discriminatory systems of a previous era.

And the whole question really to ask her is why is it that these systems are perceived as more objective or progressive? And I think the suggestion is that this has to do with the idea that it's the technology that's making the discriminations, and technology is something abstract, objective, free of human impact, et cetera. Now as I've tried to argue thus far, most of the critical engagement with the issue of anti-black and if you like, racist. Structurally racist computing technologies and apps is largely engaged with through the lens of bias.

So, the argument is that if we're treating these systems as objective, neutral, abstract, where is this bias coming from? Well, I pointed to the data sets that are used to train these apps and that's certainly one site of bias. But I would suggest that one of the problems with the tendency to think about computing systems is that we tend to think about them as technical, as if you like instrumentation, artifacts, something that is as it were distinct from and separable from human beings.

I tend to take a very different view about this. I tend to take the view that computing is fundamentally sociotechnical in nature, which means that any computing phenomena, whether we're talking about the deployment and use of computing technology, whether we're talking about the design and development of it. Whether we're talking about the abstract mathematics that is used to underpin and inform data science, machine learning, software development, et cetera. That all of these are fundamentally human endeavours, so it makes more sense to think of computing as fundamentally sociotechnical in nature, and that anything that is a focus on the technical should be seen as necessarily putting the social to one side rather than thinking of computing is fundamentally technical in and of itself, and then having to fold in the social component or the human component.

But-- and I'm really happy to see this-- that there are certain voices out there who are saying, look, the focus on bias is important and it might be necessary, but it's not sufficient and that we need to move beyond bias to consider larger issues. So here are a few quotes from an essay which appeared in 2018 entitled *The Seductive Diversion of Solving Bias* in quotes In

Artificial Intelligence. But I would suggest that these criticisms apply perhaps more generally to computing per-se rather than specifically to artificial intelligence, the original scope of the argument. So, some points to bear in mind here is that the bias problem, that the way to that is often thought about in terms of how do we solve this bias problem is largely in terms of representation.

In other words, if the problem is that the training data has historically fixated on white males, then if we include non-white males, white females, non-white females, and people in general across the board we'll have a richer data set, ergo the training data will be more representative of the human population on which it is being trained with a view to it being deployed and targeted, and thereby the kind of discriminations and patterns that it will generate will be more accurate and effectively this would solve the problem of bias. But I think the arguments that these two authors make is really quite interesting and important. So, I've just extracted a few quotes here. They've said that equalizing representation through diversity and inclusion merely co-ops designers in perfecting vast instruments of surveillance and classification. Now what I think they're getting at here is that it sounds fine to say, OK historically certain sections of the human population have been excluded from the data set so if we include them, in other words, if we give them a seat at the table as it were, then somehow we've solved the problem.

But what this fails to engage with is the fact that not all sections of the human population are necessarily the target of deployment for these technologies. So we find-- and this has been explored quite brilliantly by Ruha Benjamin in *Race After Technology*, but also earlier by Cathy O'Neil in *Weapons Of Math Destruction*-- is that when it comes to, for example predictive policing and its deployment in relation to face recognition technology, this tends to be targeted in black neighbourhoods. And this has implications on the kind of feedback loop where in policing resources are deployed to specific neighbourhoods. And so, I guess the kind of like simple take home point I'm trying to convey here is that the roll out in terms of effects on different human populations or sub-populations is different. It's not the same. So bringing people into the data set, bringing different so-called marginalized communities or peripheral sized communities into the data set, diversifying it, making it more inclusive, sounds great as a technological representation fix, but it doesn't address the fundamental issue of how the technology is going to be deployed and on what groups.

And so groups that have historically been targeted for surveillance and classification in order to mark them in some particular way, they are more likely to be victimized and targeted and surveilled by this technology if their data is included in the training data set. So, I think this, I mean this is, I find a very convincing argument. It's something I've argued in my own work. As they go on to say, when underlying systemic issues remain fundamentally untouched, the bias fighters-- those who are saying let's broaden the data set to make it more inclusive and

diverse-- simply render humans more machine readable, exposing minorities in particular to additional harms. In other words, the technology is functioning to maintain extant, that is existing asymmetries of power and the targeting of specific populations and sub-populations.

They go on to argue that what has been remarkably underappreciated is the key interdependence of the twin stories of AI inevitability and AI bias. Against the corporate projection of an otherwise sunny horizon of unstoppable AI integration, recognizing and acknowledging bias can be seen as a strategic concession-- one that subdues the scale of the challenge. So what they're pointing out here-- and again, I think this is very convincing, at least from my perspective-- is that much of the argument about how to tackle the problem of AI bias through inclusion and diversity fixes in the training data leaves untouched the question of whether these technologies should be developed at all. Whether they should be rolled out into what I refer to as the life world. Whether they should become part of as it were the background. Part of the computational background or if you like what's coming to be called the algorithmic infrastructure of the social background in which we all find ourselves.

And as they say, the end game is always to fix AI systems-- I would suggest computing systems more generally-- never to use a different system or to consider not using any system at all. In other words, a refusal position. So this leads me to a series of questions which really in a sense the opening to where I want to go with in thinking about decolonial computing.

And I want to suggest that we should take the lead of these authors and start to question beyond bias and ask these questions amongst others. Firstly, does computing need to be decolonised, and if so, how should such decolonization be affected? Isn't it somewhat of a stretch to describe computing as colonial, especially since colonialism as a phenomenon tied up with imperial structures of domination and settlement is the thing of the past? And finally, how can computing be colonial if the age of empires is over and we live in a post-colonial world?

So, in order to make sense of this I think we need to have some very brief understanding, it's a very basic understanding of what we mean by colonialism. And there are related terms that we can think about here in terms of colonization and the responses to that in terms of decolonization. And what I will get to towards the end of this talk, a kind of decolonial approach.

So for my purposes, the kind of colonialism that I think is significant is the one that really takes place commencing in the late 15th century and gets really sedimented, established, and rolled out in what is known as the long dura of the 16th century. And this is European colonialism. So, I'm not suggesting by any stretch the other previous peoples, whether it was the Assyrians, whether it was Arabs if you like, the Ottomans, Romans, et cetera.

I'm certainly not suggesting that colonialism is unique to the European experience. What I would like to suggest is that there is something very distinct and specific about European colonialism in the following sense. Firstly, it is a phenomenon that has become world systemic. Previous prior instantiations of colonialism were largely smaller scale and regional, they never ended up mapping the entirety of the planet. In other words, they weren't global in scope.

They did not institute a world system that can be viewed as capitalist or more recently as racial capitalist in nature. And they weren't predicated on a binary that comes to be understood as fundamentally racialized in some sense. They were different systems of classification, but race-- and this is contested as are most things in the terrain of History.

Race tends to really start to emerge as a phenomenon that is deployed outside of a European formation into the rest of the world and in a globalized setting with the Colombian voyages commencing in 1492, moving through the long dura of the 16th century, initiated by what come to be recognized as the Spanish and Portuguese Iberian empires. And latterly picked up by various other European players including the Dutch, Germany, Sweden, the British empire itself, the French, et cetera. In other words, there are multiple players-- the Belgians-- multiple players in a long dura project. Which initiates in the late 15th century, but moves through the 16th century, through the 17th, 18th, 19th, up to the 20th century.

And really, I would suggest the best way of thinking about colonialism is to think about this as a project of world making. And here world has to be distinguished obviously from the planetary phenomenon of the Earth itself. By world making I'm referring here to a system of interlocking knowledge, labour, and various other configurations of power which essentially determine if you like the terrain of sense making and possibility for living in that space.

So, this colonial project commencing in the late 15th century, it goes on through into the 20th century. And it really I mean, it's not to say that there is an opposition to this project going on in the colonized lands whether it's the so-called Americas, whether it's the African continent, whether it's Asia, or East Asia, et cetera, or the so-called Middle East.

There is ongoing opposition to this, but in terms of formal independence throwing off the shackles of whether it's settler colonialism, wherein Europeans actually migrate into a space, set up a colony there, dominate the local host or indigenous population. The resistance to this in terms of anti-colonial struggles this is ongoing. But it really comes to a head and maybe comes to a kind of formal ending in the 1960s with various nationalist and anti-colonial movements in the so-called former colonies or the peripheries of the world system. And although this happens and colonialism comes to its formal end in the 1960s, the suggestion is

that we don't live now in a world which is post-colonial in the sense that colonialism is a thing of the past. In other words, it was just a historical episode that has ended. But rather the structures that were put in place during the colonial endeavour that many of them remain intact and they're not merely those associated systems of social ordering and although they tend to cluster around that.

So as the slide says, it is suggested that the post-colonial era in which we live is best thought about in terms of an ongoing legacy of colonialism in contemporary societies in the form of social discrimination that has outlived formal colonialism and become integrated in succeeding post-colonial social orders. And importantly, at least for my purposes, this is true in both the core of the world's system, largely the West as opposed to the rest.

But increasingly now other places such as China and India are getting entangled in what constitutes the core or centre of the world system as well as in the periphery. And so what is important in terms of thinking about this in relation to computing as I'll attempt to show shortly is we need to think about the afterlife of colonialism in the post-colonial era as practices and legacies of European colonialism in social orders and forms of knowledge.

And think about these as persistent structuring logics, what is often referred to as coloniality. It's the way we think about, understand know, and order the world. And one way of kind of unpacking this idea of coloniality is to build on the idea of, if you like, the colonial matrix of power, which is an idea which goes back to the I think a Peruvian scholar, Anibal Quijano, has been elaborated by a number of other Latin American scholars, including Walter Mignolo, and the scholar whose material I have extracted in this particular slide, Ramon Grosfoguel. And he argues that potentially we can think about this coloniality or this colonial matrix of power, this system of structuring and ordering of various phenomena, in the post-colonial era.

In terms of various asymmetries of power or hierarchies, which he suggests are heterotopically entangled. In other words, we think about this using the metaphor of something like multiple strands of string entangled in a ball, various strands pulling on other strands. It's a good way of thinking about how Grosfoguel attempts to articulate what he means by the colonial matrix of power. That this shouldn't be thought about as a simple kind of hierarchy whereas wherein everything, all so-called super structural phenomena, such as gender, such as law, such as race, somehow maps down into some simpler phenomenon. Or maybe on a Marxist reading that might be a kind of an economic base or infrastructure, if you like. Grosfoguel is suggesting that is not the case. Although race is fundamentally the organizing principle tying together all these strands, these various asymmetries do not reduce to race.

OK. And the hierarchies or asymmetries that he's identified that are directly relevant I would suggest to the decolonial computing project, pedagogical and media informational. And I'll try to drill down into that in a little bit more detail momentarily. But before I go there, I think just by way of a couple of additional slides. In terms of thinking about race, I mean by the time you get to say around the 18th century, the idea of coloniality in terms of how to think about who counts as human starts to really be aligned very closely with the idea of whiteness. And there's a professor of human geography based at the University of Newcastle, Professor Alistair Barnett, who's done some really quite sterling work in this regard. In particular, a paper entitled Who Was White on the disappearance of whiteness from the non-West. Worth checking out if people are interested in the whole issue of how whiteness comes to collapse onto the European.

The schematic that I put up in this slide, the top diagram. This truly draws on the work of a North American indigenous scholar by the name of Andrea Smith in a paper she wrote entitled The Three Pillars of White Supremacy. And she argues that fundamentally we can think about this in terms of, if you like, anti-blackness or anti-Africanness in particular, related to the enslavement of African bodies which kick starts the whole process of capitalism, certainly in relation to the Industrial Revolution. The genocide of the indigenous populations in the Americas with the launch of the Colombian voyages in 1492, this is really the onset of colonialism. And she makes reference to the idea of Orientalism and a kind of warlike orientation of white polities, historically in relation to Middle Eastern, but also Chinese and other populations. Those who have been orientalised, if you like.

I tend to try to unpack this a little bit further. I think that's a rather crude way of reading things. And so, I have tried to unpack it in terms of five pillars, if you like. Genocide, slavery, anti-Islamism, anti-Semitism, and patriarchy. It's just different ways of thinking this through. And finally, maybe most importantly in relation to Black history month and the earlier examples of racist computing apps that I pointed to, in particular anti-black computing technologies, is to think about this in terms of a racial pyramid. And there are various racial pyramids that we can construct at different times, different places, different spaces. But the one that I think maybe is quite relevant in terms of this discussion is a racial pyramid wherein white supremacy defines the apex of this pyramid. White Europeans being at the top in position of most power and black and African peoples positioned at the base of the pyramid, having the least power.

And between those two poles of this dyad of white supremacy and anti-blackness, we have various groups periodically jostling and being jostled for, if you like, positions within the racial pyramid, brown, mixed, indigenous, et cetera. And I really like this quote from an Afro pessimist's scholar, Jared Sexton. He says that the contemporary world is structured by the twin axioms of white superiority and black inferiority. OK. So much for all that by way of background thinking through what colonialism means, what it means in the post-colonial era,

and how to think that through in terms of the logic, the structuring logics of coloniality in the present moment. Let's jump back to computing.

So, I mean, one of the ways to think about this is in so far as I've been suggesting that the world should not be confused with the planet or the Earth, but really the world is the terrain of sense, the terrain of sense making, and the terrain of, if you like, engagement. That is socially constructed and that reflects power, and importantly for my purposes, fundamentally is contoured or shaped by colonialism and its aftermath in the post-colonial moment. It becomes really interesting to think about this as a historical project, and I hope I made that case, that colonialism should be thought of as a historical project. And then we can raise a number of questions regarding computing. Because computing, like all other, if you like, artificial or artefactual or human endeavours, it has a history. So, the question then becomes, well, is it possibly the case that the history of colonialism and maybe imperialism as well, is somehow entangled with the history of computing.

And I don't claim to have the definitive answer on this, but one of the things that I have encountered through various readings of various research and discussions with various colleagues is that we can keep pushing back the onset of computing. Now, obviously people can push it all the way back to the invention of the abacus if you want to go there.

I'm suggesting that might be somewhat of a stretch. But I think we can make a pretty good case for tracing the origins of computing proper, if you like, to the 19th century, the early 19th century, time of the Industrial Revolution, the time of various struggles that are taking place in Great Britain, including the Luddite struggle in the North against the introduction of machinery into factory settings, et cetera. I think a good case can be made that the origins of computing can be found as entangled with the Industrial Revolution, which itself is entangled with British imperialism, which itself is entangled with colonialism. And that's what I've attempted to argue or present schematically in this slide.

There are various other developments we can factor in including the work by Alan Turing in the 1930s. Turing being a very important figure in the Second World War context in relation to his work on of, if you like, artificial intelligence and machine learning as well as the theory of computing itself. And there's been some very good historical work done by a historian based, I think UCL entitled-- I think it's Turing And the Universal Computer by Jon Agar. And Agar has a number of really very insightful points to make about, if you like, the colonial entanglement of figures like not only Charles Babbage, the inventor of the difference and analytical engines in the 19th century, but also Alan Turing himself in the 20th century. And I've just tried to flag up some other developments such as developments in cybernetics in the 1940s at the Dartmouth College workshop on AI in the 1950s, and the origins of the internet from ARPANET onwards in the 1960s and 1970s.

And how all of these developments, whether we're talking about the difference engine and the analytical engine, which takes place against the backdrop of British imperialism. Whether we're talking about cybernetics and the code-breaking work of Turing and others, which takes place against the backdrop of World War Two. Or the invention of the internet and speculations about what AI might be, what it might look like, which takes place against the backdrop of the Cold War. It's important to understand all of these developments within these technologies are taking place against the backdrop of some form of either imperial or militaristic struggle. So, I would suggest this is fundamentally pointing to an entanglement in the genealogy or history of computing with militarized imperial and colonial endeavour. And as I just want to flag up again, all of this is, again, going on against the backdrop of ongoing anti-colonial struggles. Again, formally ending in the 1960s.

OK. So where am I going with all of this? I want to suggest that this kind of line of argument, and if you're convinced and persuaded by the idea that the colonial project has an afterlife in the post-colonial era in terms of the structuring logics of coloniality, in terms of social ordering, systems of knowledge production and dissemination, ways of ordering the life world of interaction.

I'm suggesting that computing had and retains what I refer to as a colonial impulse. And in fact, this idea is drawn from a very interesting paper which goes back to 2012 by two HCI researchers, Paul Dourish and Scott Mainwaring. And the paper was entitled, Ubicomp's Colonial Impulse. Ubicomp means ubiquitous computing, which is the kind of computing that is pervasive and diffused out into the life world. So, things like swipe cards, recognition systems, et cetera. And they argue, and I quote, "Colonialism is a much more pervasive aspect of ubiquitous computing than we normally give it credit for. In fact, it is entwined with all sort of aspects of how we think, how we talk and how we work in ubiquitous computing."

And I agree with this. And what I want to do is I want to suggest that it doesn't just apply to ubiquitous computing, but to computing in the main. In other words, whether we're talking about the internet of things, machine learning, deep learning, AI systems. Whether we're talking about mobile computing, whether we're talking about human computing interaction, whether we're talking about so-called ICT's for development. That is information and communication technologies for development, et cetera. That fundamentally this colonial impulse underpins everything that's happening. And I want to suggest that this should be a cause for some concern insofar as more and more of these technologies are convergent.

That they are being networked together in configurations of greater and greater and greater scale. So much so that I would suggest-- and I think I mentioned this earlier in the talk-- that we might be dealing with something like a computing or a computational or an algorithmic

infrastructure which is expanding through the world, and arguably attempting to cover the world.

And so, I try to represent that briefly with the idea that it's not so much that we have a world system in which computing is happening, it might be that as computing expands, it becomes the world system. So that if you like racial capitalism, or the colonial modernity starts to increasingly operate through a computing, if not computational kind of technological infrastructure. And we see this kind of recently with various arguments about what might be going on in terms of the rollout of these technologies by big tech platforms such as Facebook, Google, Amazon, Apple, et cetera, add to the list as you will. And we're finding this in the arguments of people like Shoshana Zuboff, who maintains that we have now entered an age of what she refers to as surveillance capitalism. Or the works of people like Nick Coldry and Ulises Mejias who refer instead to data colonialism.

So the argument is being made that whether we are framing this as surveillance capitalism, data colonialism, digital colonialism, there seems to be some recognition that the kind of argument that I'm attempting to make has increasing traction with different voices, including those located both in the global North as well as the global South. OK. So, moving forward to decoloniality, and I'm aware of the time so I'm just going to try to deal with this relatively quickly. I've talked a lot about colonialism, I've tried to show what is meant by coloniality in terms of colonialism's after life. I've tried to show how this is entangled with computing in terms of computing infrastructure.

So, it's not just about thinking about who is doing the computing, how are they doing it, where are they doing it from. In other words, looking at the people component of the sociotechnical. But also, I want to suggest that we need to think about the very technologies themselves.

In other words, we need to think about infrastructure. But what might it mean to take a decolonial approach in relation to computing? Well, what is decoloniality? So, just quickly I would suggest that we could reduce it, and there's always a danger with reduction, but we could reduce it or summarize it in terms of three commitments. Firstly, a critical, that is power relational approach to thinking that emerges in the colonies and ex-colonies. In other words, there's an attempt to think about asymmetries of power when considering any phenomenon under consideration. It's a trans-disciplinary horizon foregrounding race as the organizing principle in a system of entangled structural hierarchies. I mentioned that earlier drawing on the work of Ramon Grosfoguel. And there's a focus, there tends to be a focus on epistemic, that is knowledge, kind of focal phenomena. But it's also ontological as well. So, there's a consideration of the very being if you like, of people and their relation to technologies and thinking about decolonization in that context.

And again, how to think about decoloniality. Sometimes scholars like to invoke the idea of geopolitics and body politics of knowledge. So, what they mean by this is the importance of thinking in terms that are concrete, that is material, embodied, particular, and raced, rather than abstract. That is immaterial, disembodied, universalizing, unraced or deraced epistemology. So, you're always asking questions about who is speaking and where are they speaking from. And thinking from the margins, the borders, and the periphery of the world system. And in terms of marginalized knowledges rather than thinking from the core. So again, just to summarize this it's about where, when, who, and how knowledge is being constructed and deployed.

And so, I like to think about this in terms of asking a number of computing questions, decolonial computing questions. And four tend to preoccupy me or have done in the past.

How does computing as a modern colonial phenomenon help to maintain, expand, and refine colonial modernity, assuming it does. Now try to make the argument for that. How can computing as a modern colonial phenomenon be resisted, assuming it can. What is computing, who gets to decide this, from where, and when and how? And what does it mean to do computing from the borders or the margins of the periphery of the world system?

And this leads me essentially to two maxims. These are the kind of like take away maxims. These are the more, kind of, we could say, optimistic kind of decolonial computing maxims. I suggest that practitioners and researchers adopting a decolonial computing perspective are required at a minimum to do the following. Firstly, consider their geopolitical and body political orientations.

In other words, where are they located and who are they, when designing, building, researching or theorizing about computing phenomenon. And secondly, embrace what is known as the decolonial option as a compensatory ethics, attempting to think through what it might mean to design and build computing systems with and for those situated at the peripheries of the world system, informed by epistemologies located at such sites. And importantly, with a view to undermining the asymmetry of local-global power relationships and effecting the decentring of Eurocentric or West-centric norms and universals.

Just finally. In terms of decolonial computing skills I'm really quite, what should I say. Well, let's just put it this way. I'm enthused and delighted to see that increasingly there are calls being made by practitioners, researchers, theorists, as well as activists to suggest that computing needs to move beyond its tendency towards the technical and embrace a fundamental entanglement with the social. I tried to make the case that computing should be thought of as sociotechnical, anyway. But here's a quote from 2016. About the importance of the relevance of algorithmic skills that allow a facility with the relevant ideas in math and computer science as well as the education of computing professionals in social science and

ethics, and I would add to that politics. Yet saying that today's ethical critique needs a facility with these tools of computing imagines a different kind of scholar who is able to bridge the social and the technological.

And I think that's an argument I would suggest for the sociotechnical. And finally, this is something I saw more recently. And this speaks directly to our institution as well as the University sector, more generally in relation to its computing and related programs.

Universities must create space in their programs for hybrid degrees. They should incentivize computer science students to study comparative literature, world religions, microeconomics, cultural anthropology, and similar courses in other departments. They should champion dual degree programs in computer science and international relations, theology, political science, philosophy, public health, education, and the like.

Ethics, and I would add and politics, should not be taught as a stand-alone clause something to simply check off a list. And usually, it's the last module or the last part of a module in a computing program, unfortunately. Schools must incentivize even tenured professors to weave complicated discussions of bias, risk, philosophy, religion, gender, and ethics in their courses. And I offer my word of support to that.

Thank you for listening.