# 2016 Conference Transcription

| | |
|---|---|
| Date | Friday |
| Session Title | Thriving in Uncertainty |
| Session Time | 15:00 – 15:25 |
| Moderator | n/a |
| Speakers | Lydia Nicholas |
| Notes | n/a |

# Introduction

| | |
|---|---|
| Voiceover | Hello and welcome to Future Everything's 2016 Festival Podcast Series. Over two days, in Manchester's iconic Town Hall, we tasked designers, artists, scientists, and many more, to rethink our resources. From life, earth and intelligence, to community and uncertainty, our speakers asked what we might need less, and more of, in our near future.<br><br>Speaking in this Thriving in Uncertainty session, we heard from Lydia Nicholas, a collective intelligence researcher. She works in places where data, identities, bodies and biotechnologies meet, focusing on futures and networks. The work she does often uses speculative fiction as a research and communication tool. Looking at the journey of health and medical data, Lydia's talk examined how we shouldn't trust certainty. |
| Speaker | I spoke yesterday quite broadly on a similar theme about the interplay between the tools that we use and the way that those produce habits of thought that can become ruts and steel rails that lead us towards certain destinations.<br><br>Already it's been quite a long session so you've heard a lot about different kinds on uncertainty. This is going to be me delving into one specific example of how certainty is constructed in one specific field.<br><br>I'm an anthropologist. I come out of the Material Culture Department at UCL and somehow I've ended up working primarily in digital spaces and with immaterial things like the development of ideas and how decisions play out. So it's wonderful when I get a chance, because I'm a person working in a field that tends to prefer specific grounded examples, to follow… I like to follow a stuff. So here I've been able to follow information as it travels through the scientific and medical community, as it moves from these kind of wet petri dishes through |

| | |
|---|---|
| | readings in a scanner, through scribbled notes into journal papers, the system of reviewing and reviewing and then publishing into contract, into pharmaceutical factories, into negotiations with the NHS and eventually into drugs in a pill packet that you get handed by your doctor.<br><br>I want to think about the places where information of different kinds can get stuck in that long process, where it can get shifted or twisted, just a tiny bit as people try to push information from one stage to another in this long process to get to the end.<br><br>That means that the information we get out at the end of this process can be true. It might be certainly true, but still it manages to warp our understanding of the world in profound ways, because other equally true information never made it through. Other truths were never produced. Every data point is surrounded by the silenced. Because perhaps those truths were too expensive, perhaps they were too strange, too complicated to understand or to sell. Perhaps they didn't seem important. So some things get dismissed as errors or overlooked.<br><br>Often also we, and scientists I'm thinking of specifically, are pressured to make explanations sound more simply or more certain than they actually are. Over time, individual decisions about what gets through and how the systems are [inaudible 03:29] grow into whole systems of academia, of research industries, of markets which then create and strengthen their own gateways that information must struggle to get through. It creates ever stronger incentives to produce certain forms of information and to ignore others.<br><br>As a simple example, a multiple choice exam and its results can be averaged and compared at the scale of the individual, of the school, of the city and of the region. To borrow the financial term, it's liquid information. It moves easily from place to place, from form to form and from scale to scale. But of course an exam can't capture all of the information that a poem does. We know it's not the full picture, but the quiz is so cheap and the information that it produces flows into databases and charts and systems of analysis so easily, that it's what ends up being used to decide funding and to decide kids' futures. So knowing its limitations still, teachers and children alter their behaviour to fit the information that the system can read.<br><br>And of course we stand at the dawn of a data age. The amount of information being captured about us, about the world around us, it's all growing exponentially. So in order to cope with that, of course we have to develop more bureaucracy, more algorithms which can analyse and make decisions based on that information and can support us making decisions. So it's a great challenge and an opportunity right now to think about what information we are capturing and what we might be missing. What biases we're encoding into these systems. Because of course we build a future based on this information, and if we are reproducing biases and blind spots, we can in fact alter the world to reflect what we think the world is. And that may not work in the best interests of either us or of the truth. |

| | |
|---|---|
| | So I went to investigate these issues in an interdisciplinary synthetic biology project for two years. This is what synthetic biology is. It's about breaking down living organisms into stable functional parts and plugging them back together to produce useable and effective and efficient things. So you get the gene for glowing pink plus the gene for detecting a pathogen or an infection. You plug them together, and boom, you've got a bandage that glows pink when a wound is injected.<br><br>It's an emerging field, which is great fun for an anthropologist, because all the assumptions about this is the way that we've always done things aren't really there yet. People have lovely, loud arguments about exactly how they're going to proceed with designing a process. And the team that I was working with were both designing an organism and trying to develop a new modelling tool that could predict the outcomes of simple experiments and so speed up the process for other teams in the future. So as well as wet lab biologists that actually work with lovely growing things in petri dishes, there were also computer scientists and computational biologists and complex system modellers.<br><br>The important thing to think about is that at the end of a biology science experiment and a computer science project, if you're lucky, you get a scientific peer reviewed paper, which are both kind of accepted as pretty much the same level of true. They both pass that benchmark. But before that of course, there's a lot of mess. There's a lot of difference. When they're trying to work together, that means that there's a lot of arguments and these can be practical as well as scientific. There can be arguments about how you schedule things, when you should be meeting, at what point you should be sharing information.<br><br>These are arguments that the computer scientists always win. Because the kind of information that computer scientists produce are much easier for the university system to use and to understand. It looks a lot more like the bureaucratic systems that the university is using to judge the value. Computer scientists' work easily moves through the system. It shifts from machine to machine, from place to place. It's easy to replicate, it's easy to reuse. And they can run their experiments a thousand times. They sit in one place, they're easily managed, they debug, they compare, they're tweaking variables, they're checking each time how their results are improving. Debugging, debugging, debugging. So they can fill in their schedules pretty clearly. They know where they're going and at what point in the process they are.<br><br>Biologists work starts a long way off from clean numbers. It has a lot further to travel, a lot more transformations before it looks clear and precise. It's about growing things overnight. It's like coaxing a particularly sulky plant. And then later you line up these samples and you see the different blue-purple tints in the [inaudible 08:16] array. You line them all up and you have to make a judgement call a lot of the time. You have to dilute the mixture just the right amount so that the differences between different samples fall within the very tiny field that the laser can tell the difference between the colours because it's calibrated for that particular level of concentration. |

| | |
|---|---|
| | One told me once that his experiment had been working for ages, for months, and then suddenly it stopped and it took them weeks and weeks and weeks to work out why this thing wasn't working, this major factor while changing the experiment. It turned out that the administrator a few levels up had switched agar suppliers. This was a supposedly chemically identical bacteria feed, but it wasn't. The bacteria knew and the bacteria sulked because they weren't getting their favourite food. They still don't know why that caused it to fail.<br>If something works the first couple of times, it could easily be a fluke. The next results could all be different and it might take you months to work out why. You could never know.<br><br>And so there are these arguments. The computer scientists want the very latest information so they can check how well their simulation has predicted the experiment's outcome. To a computer scientist, and I was a programmer for years, things are never not ready to be shared. They need to be shared and iterated in order to be improved. That's how coding works. That's how you learn to code, by sharing and copying and iterating and trying things out. But to a biologist, a half done experiment isn't fifty percent of a true fact. It isn't half done. It isn't anything at all. So one of them snaps this at the computer scientist, and then an argument about why they couldn't put a particular percentage number on how near they were to the end of an experiment. I love this quote. It's about how the organisms are alive and unpredictable. They have agency, they have quirks.<br><br>A lot of the people that I interviewed in this project, they are pretty open about having a clear hierarchy or information forms in their heads. This is from a complex system modeller who sits with a lot of different teams and helps them model what they're doing. He quite openly liked sciences that were purer with less environmental factors. He would say there's physics, there's chemistry and there's biology and talk about how the purer sciences were easier to program, to simulate and to replicate.<br><br>And that's true of so much of our world. If something can be abstracted and replicated easily, then it can move through the system quicker. It's more valuable to more people. It can be reused and resold with less of that bothersome human involvement and localisation. It's liquid information. It's a liquid asset and so it flows through our markets.<br><br>But being easier to quantify doesn't necessarily make something more true. One biologist that I interviewed interrupted the series of questions I was going through to say 'you do realise none of this is real, don't you?' He explained that the bacteria in the lab that he was researching had responded obviously to the evolutionary pressures of being in that lab. It's been living in the laboratories for so long that it's lost any sense of the real world. We take care of them in return for them being easy to use. Real wild E.coli, he told me, they're too unpredictable. They undergo evolution too fast.<br><br>The system's pressure for producing the clear, clean, certain looking results that the PhD students needed from their supervisors, that the team needed from their funders, from peers reviewers, exerted evolutionary pressure on the |

| | |
|---|---|
| | bacteria itself. It's not that the results that they were getting weren't true or were faked, but the whole system of truth production was biased and was exerting pressure on these living things.<br><br>It's like the classroom test on kids. It changes us. It changes how we respond. Life is unstable. It's interconnected, it has a lot of stochasticity or randomness and so the answers aren't necessarily always whole, complete or certain. Sometimes bacteria just hibernate. We don't know why. Sometimes they misread a signal from a nearby cell and react weirdly in response and accidentally replicate a program or a sequence of DNA slightly wrong and it really messes up your experiment. But that's what evolution is and that's the most powerful, robust feature of life. That's why we're studying it and trying to learn from it in the first place. In our attempts to get a stable measurement, we may miss or even distort the most extraordinary properties of life.<br><br>Why is this a problem in really urgent terms right now? I'll summarise that for you. In 2006, in a North London hospital, a drug for leukaemia that had been tested on hundreds of mice, rabbits and monkeys before with absolutely no adverse consequences was tested on humans at one five hundredth the dose that the animals had received. A first small introduction of the dose of this compound into humans produced an immediate and catastrophic reaction. There was systemic organ failure in all of those who received the drug. They were rushed to intensive care. One lost all of his fingers and toes. Another was showing signs of developing cancer within months. Their immune systems were ruined for their entire lives. None of them will fully recover. Why?<br><br>Well that – but don't worry. There's also this. A bit easier. The most recent research broadly agrees that… the thing is that the human volunteers had functioning immune systems that had developed over a messy lifetime. Their T-cells had learned from every childhood infection, every winter cold. The animals who served as test subjects had grown up in sterile laboratories in white, clean boxes that look as near to a spreadsheet cells as can be. So we use the transition of information out of their bodies, into databases, into scientific papers. But that pressure meant that they failed to produce treatments for humans, which they're not. They're not clean and simple to understand like spreadsheet cells. All the laboratory mice pretty much in all the clinical trials that we run on them are identical twins and people are not. You could test in field mice, but of course, that would take forever.<br><br>The fit to the information production system to the pressures being put on them does not necessarily mean a fit reality. A fit to the affordances of capitalism is not necessarily the same as a fitness for purpose.<br><br>Now, no-one is saying that cures and knowledge aren't things that we want. We want desperately and we want fast. But obviously we need to fix this distorted picture. It sounds like a huge problem and fortunately I'm not the only one asking it. In October last year, Nature had a whole issue on reproducibility and this crisis, which they were calling a crisis. A key point was the problem of how the academic system is pressuring scientists to produce certain types of results |

| | |
|---|---|
| | which look like good and certain answers in order to be published but may actually be distortions.<br><br>Scientists experience this pressure and this unconscious bias at every stage of experimentation, at the process of gathering data and cleaning data, at the tweaking of inputs and algorithms.<br><br>This was a great case study about having teams work on the same question. The question was actually ‘do players with darker skin get more red cards in football than their lighter skinned colleagues?’ These are all teams that were working on the same dataset with the same question. But because there was a very slight difference in their methods and their applications, they came up with wildly different answers. Of course, in most scientific experiments that you see the results of, there’s only been one approach taken and that’s assumed to be the answer.<br>So essentially, Nature is arguing that the pressure on scientists to produce clear, certain looking discoveries is leading them away from an honest representation of the messy, complex reality of the world. The uncertainty.<br>I tend to end with a bit of rousing call. What can we do to ensure that we do not move forward with blinders on and reproduce a narrow, clean, biased version of reality that narrows down the tracks and warps our world? Can we redesign a system that values uncertainty, which sees all answers as partial, as all hard, quantified statistics as the result of a story, the result of a hundred qualitative decisions, decisions which have shaped the tools available, the pressures, the interests we serve and how we determine a valuable truth?<br><br>Nature proposed that the use of collaborative crowd-sourced research models where questioning and improving on one another’s answers was encouraged rather than something that was seen as a challenge to one another. But obviously this requires quite a change in mind-set right at the top.<br><br>I think as well that we don’t need just change at the individual level, at the level of these teams. Institutions need to change. The culture of respecting dishonest confidence over honest uncertainty needs to change. Because every time that we share knowledge, we’re part of developing that system through which information is produced and reframed. And we’re reframing the past and our potential future so hopefully we can create one which values and respects our fluctuations.<br><br>I apologise for the massive font. But there we are.<br><br>Thank you. |
| Voiceover | We hope you enjoyed Lydia’s talk and thanks for listening. You can hear the rest of the talks from 2016 at futureverything.org/2016podcasts. |

[Transcription ends]