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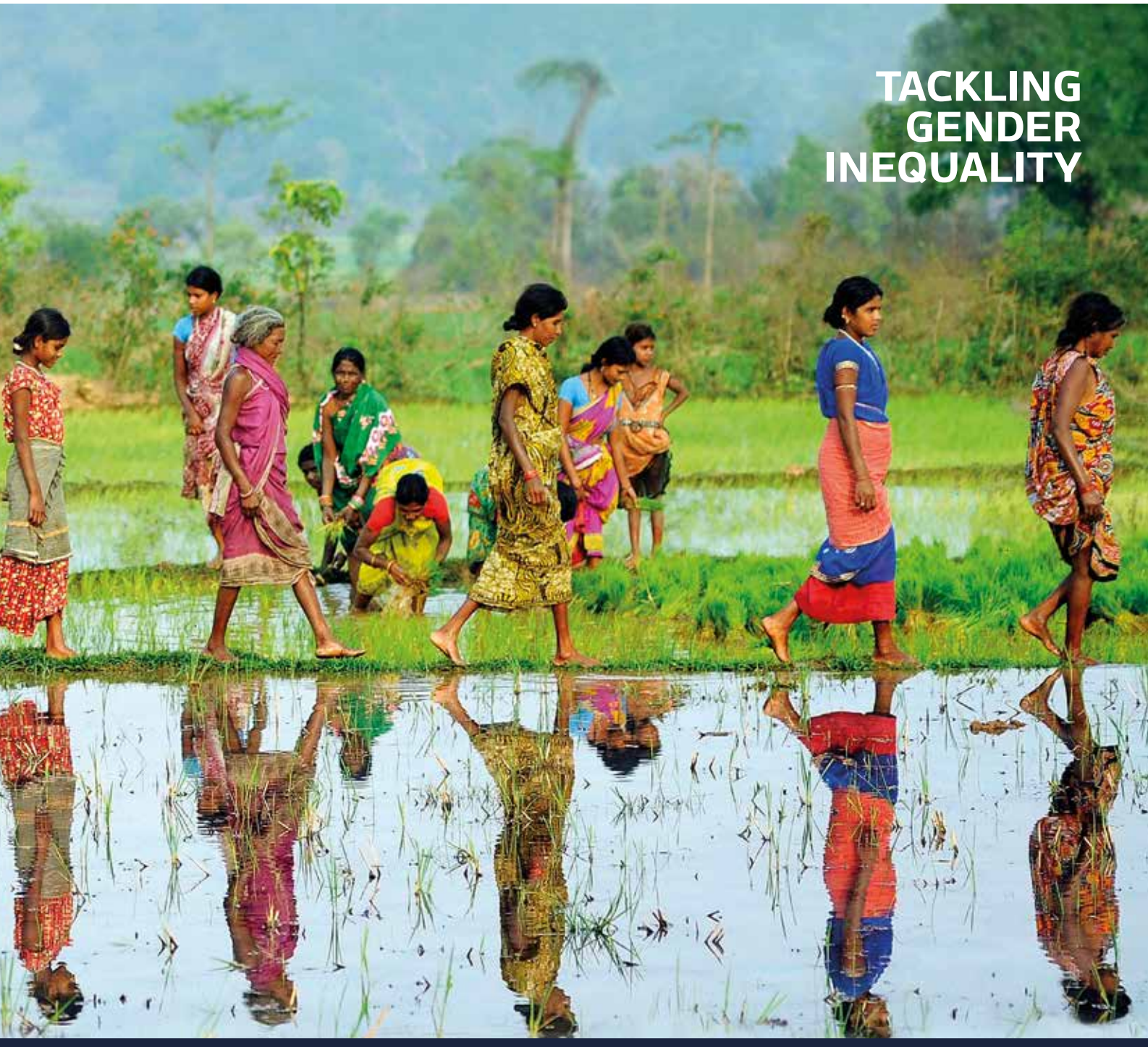
THE SCHOLAR



TACKLING GENDER INEQUALITY

UNIVERSITY OF CAMBRIDGE

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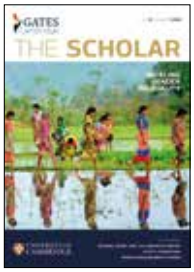

The Scholar, 2018

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The Scholar is the publication of the Gates Cambridge community. Articles that offer a window into the lives and work of Gates Cambridge Scholars and Alumni or articles that tackle large interpretive questions relevant to the Gates Cambridge mission are particularly encouraged. Highly focused contributions are welcome, but preference will be given to submissions that are of interest to a diverse cross-section of readership in more than one discipline of study. Contributions are subject to editorial approval. Ideas expressed are those of the authors alone.

Editors' note

Dear Reader

I am delighted to welcome you to the 2018 issue of *The Scholar* magazine. Each year, this magazine provides a platform for the efforts and ever-increasing impact of the Gates Cambridge scholar and alumni community. The following pages celebrate the work of 24 scholars, who here offer their insight into issues of global importance.

Several themes organise this year's selection of articles.

Six of the articles featured in this year's magazine focus on obstacles to gender equality. Sharmila Parmanand discusses the gendered political language of Philippine President Rodrigo Duterte and its influence on women's access to political participation. Tara Patricia Cookson illustrates how a popular anti-poverty programme has hidden costs for mothers in Andean Peru. Asiya Islam argues that while paid work is often seen itself as a form of empowerment, exploitative conditions can make women's employment unsustainable and undesirable in India. Taking a close look at modern anti-human trafficking policy, Anna Forringer-Beal discusses the lack of critical support services for survivors of trafficking. Working through her experience as a journalist in Ecuador, Jessica Van Meir shares the stories of sex workers who have organised to fight for their rights. We conclude by sharing details of the first-ever strategy by the Bill and Melinda Gates Foundation to target gender equality in the fight against poverty.

Moving from gender equality to science and medicine, Larry Han opens by examining the "weekend effect" – the increased risk of death for those admitted to hospitals in the UK during the weekends. As scientists and philosophers, Max Stammnitz and Joseph Wu together discuss whether it is ethically imperative for humans to intervene in the recent outbreak of transmissible facial tumours that threaten the Tasmanian devil population. Addressing emergent technologies in scientific research, Elyse Fischer, Anantha Kumar, and Chris Rae share how a new technique in microscopy is enabling scientists to visualise intracellular mechanisms in unprecedented detail. Next, Adriano Bellotti argues that a combination of "dry lab" computational techniques with "wet lab" experimental research is necessary for a refined understanding of the human brain. Finally, Henry Cousins explains how studying changes in the blood may lead to non-invasive tests for Alzheimer's disease.

On the theme of disaster and displacement, Emma Houiellebecq argues that, however tragic, disasters are themselves opportunities for cities to identify and address their vulnerabilities. From the U.S., Genevieve Barrons shares the details of a project that she runs out of the Massachusetts Institute of Technology (MIT) Media Lab that supports the development of educational technologies for refugees.

We then share the inspirational story of alumna Tara Westover, whose unwavering determination to seek education – despite her father's disapproval – is now the subject of her #1 New York Times bestselling memoir.

Our next set of articles spotlight the theme of journalism. Jonathan Corpus Ong argues that creative and collaborative solutions are needed to counter the popular charges of "fake news," while Cerianne Robertson discusses the impact of the Olympic Games on global news trends.

Finally, Parker Lawson, a cultural historian of modern Spain, examines a contemporary crisis in Spain within a deep, historical context, and Chioma Vivian Ngonadi discusses how the involvement of local communities in archaeological and conservation projects is crucial for the sustainable protection, management, and development of archaeological sites.

This selection of articles exemplifies the spirit of the Gates Cambridge community, and testifies richly to the fierce dedication of Gates Cambridge Scholars, past as well as present, to improving the lives of others. I extend my warmest gratitude to our contributors, our editorial team, and our advisors at the Gates Cambridge Trust for making *The Scholar: 2018* possible.

Editor-in-Chief
Sahba Seddighi
2017, Iran/USA, MPhil Epidemiology

THE GREAT DIVIDE

The refugee education crisis and how digital learning can help

Worldwide, less than 1% of displaced people have access to higher education.

Historically, this statistic has not attracted a great deal of attention: before 2013, most displaced people came from countries where higher education attainment was already relatively low. This changed with Syria. Before the war, about a quarter of Syrians were enrolled in post-secondary education. As they crossed borders, and later seas, Syrian young people requested not just asylum, but also access to higher education.

Despite increased global attention – in 2015, higher education was explicitly mentioned in the United Nations Sustainable Development Goals for the first time – education systems have struggled to respond to the sheer number of displaced young people who aspire to post-secondary education. Universities in the major refugee hosting countries are typically already overstretched and underfunded. Scholarships are the go-to response, but these are insufficient. They pluck lucky individuals, not unlike ourselves, from wherever they are and offer a life-changing experience. But scholarships are impossible to scale; they do not produce systematic change.

Digital education is an obvious option, and most Syrian refugees do have access to smartphones and some connectivity. But despite the pace of technological development in recent years, neither the internet nor related technologies have radically transformed the provision of formal education at any level. We have not yet developed mechanisms for recognising the learning people do online. The vast majority of people who complete Massive Open Online Courses (MOOCs) already have degrees. We know how to disseminate content via the internet, but not other aspects of education – in particular, the learning community.

At the Massachusetts Institute of Technology, I run a project which aims to support young technologists from the Middle East to imagine and design technologies that could be used to support learners, specifically in countries affected by the Syrian refugee crisis. We spent January in Amman, Jordan holding a workshop with computer scientists and engineers from Syria, Jordan, Lebanon, Iraq and Palestine, exploring how relatively simple technologies might make learning more accessible to displaced people – not simply by making content available to them, but by building chatbots that help navigate foreign education systems, or apps that share notes between classmates who do not fluently speak the language of instruction.

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A huge number of qualified Syrians are unable to gain access to higher education or qualified employment because they left all evidence of prior learning behind when they fled.

I am not a techno-salvationist. Technology is never going to replace a good teacher. The solutions our teams develop are unlikely to radically change the face of education in the Middle East. The programme is more about capacity building than launching the next big start-up. But we are contributing to the ecosystem: supporting smart young people with tech skills, as they imagine how technology can make education better and more accessible to more than just a lucky few.

Increasingly, the higher education attainment of the lucky few marks a major division in our societies. One need only look at the results of recent votes: the strongest demographic predictor of whether a Brit voted for

Brexit or not was if they had a degree. Access to higher education reifies inequality. If displaced people – now displaced for an average of 17 years – consistently lack adequate access to quality education, and in particular higher education, it will only solidify their status as second class global citizens. Although I have argued that scholarships are an insufficient response, it is worth noting that from the three major "refugee producing countries" – Syria, Afghanistan, and Somalia – only two Gates Cambridge Scholars have ever been selected. One from Syria, but she was a scholar long before the war there began; one from Afghanistan, but he appears to have never taken up his place.

Working with refugee students, one quickly realises how much of the societal value of education is the paperwork rather than the learning. A huge number of qualified Syrians are unable to gain access to higher education or qualified employment because they left all evidence of prior learning behind when they fled. We do not have adequate ways of testing actual skills, and so we rely on transcripts and diplomas. It is often the universities that are most resistant to technological innovation – to anything that jeopardises their credential monopoly and business model. It behoves us, as the lucky few, to consider how our education reifies these divisions, and how new kinds of education and accreditation might begin to bridge them.

Genevieve Barrons
2013, USA, MPhil Education

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The Fake News Industry

The architects of networked disinformation

In the midst of the global debate on fake news, one report argues against one-size-fits-all approaches to disinformation interventions by unpacking specific challenges of mediated populism in the global South.

In the Philippines, moral panic surrounds influential online personalities and "troll armies" credited with winning Rodrigo Duterte the presidency in 2016. In our report published by the Newton Tech4Dev Network, we show that the problem of political trolling and disinformation is in reality more insidious, systemic, and deeply rooted than any single hero or villain. Through our field research in Manila, we got to know the "architects of networked disinformation," who gave us unprecedented access to the digital underground.

Highly professional, hierarchical organisation

The architecture of networked disinformation is an invisible machine: hierarchical in its organisation, professional and strategic in its outlook and expertise, and exploitative in its morality and ethics.

Occupying the top level of the disinformation hierarchy, ad and PR executives play the role of high-level digital strategists motivated to prove their clout in a new professional and political arena. They hold leadership roles in "boutique agencies," handling a portfolio of corporate brands while freelancing for political clients on the side.

Anonymous digital influencers operate Facebook or Twitter accounts that have anywhere from 50,000 to 2 million followers. Their purpose: to hack public and media attention through humour, digital black ops, and online trending.

At the bottom of the hierarchy, community-level fake account operators do script-based disinformation work to create an "illusion of engagement" that affirms key campaign messages and encourages real, unpaid grassroots political supporters to join the bandwagon.

Fighting disinformation

Understanding that fake news is the outcome of the professionalisation and normalisation of political deception rooted in ad and PR industries means we need creative and collaborative solutions in fighting disinformation. Understanding this is key in taking a stance against the way disinformation is influencing political discourse, rewriting narratives, and shaping democracies, both in the Philippines and far beyond.

"Architects of Networked Disinformation: Behind the Scenes of Troll Accounts and Fake News Production in the Philippines" is published by the Newton Tech4Dev Network. The project was funded by a British Council Newton Fund grant.

Jonathan Corpus Ong
2007, PhD Sociology

Biography: Jonathan Corpus Ong is currently Associate Professor in Global Digital Media at the University of Massachusetts at Amherst, USA and convenor of Newton Tech4Dev Network (newtontechfordev.com). He received his PhD in Sociology from the University of Cambridge in 2012.

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SURVIVING THE WEEKEND EFFECT

Emergency department mortality in the UK

Numerous studies have identified an increased risk of death for people admitted into a hospital on the weekend, rather than during the week, across a spectrum of countries and diseases. What is called the "weekend effect" persists in emergency departments in the UK, in acute settings for myocardial infarction and kidney injury in the US, and for a number of other diseases in Canada.

This excess mortality phenomenon has recently gained public policy significance far beyond medical and health services researchers' interests. UK Secretary of State for Health, Jeremy Hunt, claimed that 11,000 patient deaths per year were caused by understaffing of hospitals on weekends. Hunt proposed a new initiative in a move toward a "truly seven-day NHS".

This push has led to an increase in weekend staffing levels of junior doctors (qualified medical practitioners pursuing postgraduate training; termed *residents* or *fellows* in the US) without increasing compensation. Junior doctors' disapproval of the proposed contracts led to the first-ever all-out strike in the NHS's history, leaving emergency departments without physician coverage. Stephen Hawking and a number of prominent physicians have stood up in support of junior doctors, arguing that Jeremy Hunt is causing a "devastating breakdown of trust between government and the medical profession".

In fact, the team that I am involved in as the lead researcher has put into question the basis for Hunt's push, rethinking the causes of the "weekend effect" with a longitudinal study at Addenbrooke's Hospital, one of the largest teaching hospitals in the UK. Analysing 650,000 emergency department visits from 2007 to 2013, we show that the weekend effect is halved among patients admitted to hospital wards when controlling for patient-level risk factors, such as age, frailty, and discharge, and differential discharge rates between weekday and weekend admission. To the best of our knowledge, our study is the first to appropriately account for patient case-mix in accurately estimating mortality.

Our results have important implications for emergency department staffing, occupancy, and care, indicating that the government's push toward a "truly seven-day NHS" is not only costly, but may in fact be ineffective in reducing mortality.

Larry Han
2017, USA, MPhil Operations Management

Biography: Larry Han graduated with a BSPH in Biostatistics at UNC Chapel-Hill and obtained a Masters in Global Affairs at Tsinghua University. He will begin his PhD in Biostatistics at Harvard in the fall.

CENTRING SURVIVORS

Rethinking the approach to anti-slavery policy

In the wake of recent international upheavals, including the refugee crisis, Brexit, and continued war, the concern over human trafficking has come to the forefront of development and politics. Now more than ever, it is essential to critically examine the origins of anti-human trafficking policy and its current implementation.

In 2012, lawmakers in the UK were searching for ways to enforce immigration laws related to migrant domestic workers. Their solution was to invalidate visas if domestic workers chose to leave their original employment, essentially tying domestic workers to their employers permanently. Shortly after this policy took effect, non-profit organisations supporting survivors of trafficking, such as Kalayaan, saw an increase in the maltreatment of domestic workers who were too afraid of deportation to leave their abusive employers.

Victims of trafficking feel the consequences of this policy in their daily lives – yet when the Modern Slavery Act of 2015 (MSA) came into effect, there was no remedy to this well-documented problem. Rather, policy officials used the MSA as a platform to increase immigration control and business regulations through policies such as supply chain reporting and expanded maritime laws. While these regulations are a step towards eliminating trafficking, they approach this goal from a criminalisation standpoint at the expense of survivor's rights. As a result, the MSA has received substantial criticism from victims' rights advocates.

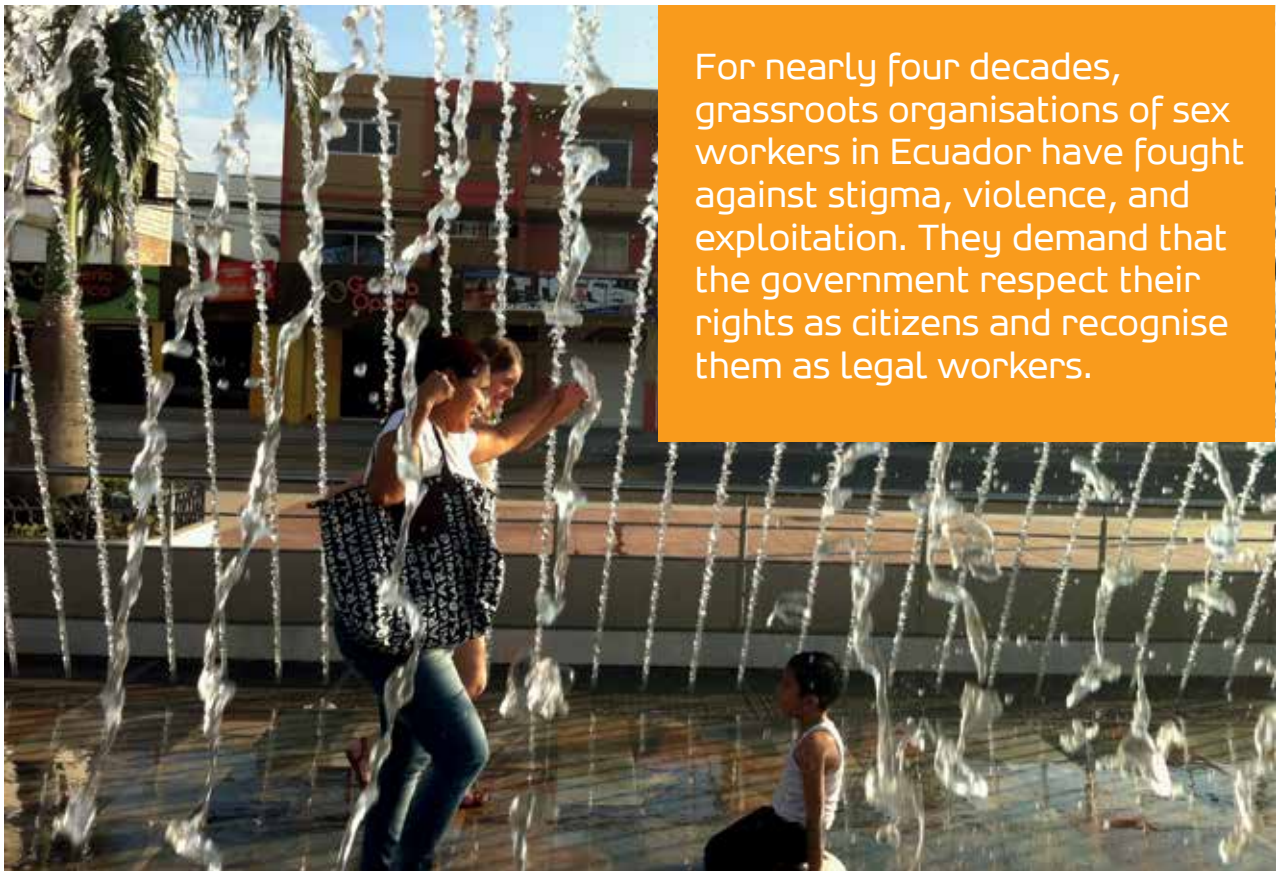
Although policy makers were made aware of these shortcomings, they choose to move forward with the MSA. My research seeks to answer "Why?" With the volume of survivor focused research currently available, why move forward with a law that does not live up to its full potential? And why choose criminal interventions over a human rights based framework? Maintaining that some improvement is better than none is too simplistic of an explanation. I argue that these decisions are linked to previous immigration and criminal regulations dating back to the early 1900's to end what was then called "White Slavery". These early laws used one-dimensional representations of migrants and women to enforce strict border control. Even today, the definitions of modern slavery and human trafficking draw on language used in these problematic regulations. Turning the question back to lawmakers can identify the historic factors influencing contemporary mindsets on anti-human trafficking policy and identify points of change.

Anna Forringer-Beal
2017, USA, MPhil Multidisciplinary Gender Studies

Biography: Anna Forringer-Beal is an aspiring policy writer whose background in direct service work shapes her perception of law as a tool for change. She is currently a master's student in the Multidisciplinary Gender Studies programme at the University of Cambridge.

Sex Workers and Activists

Fighting for rights in Ecuador



For nearly four decades, grassroots organisations of sex workers in Ecuador have fought against stigma, violence, and exploitation. They demand that the government respect their rights as citizens and recognise them as legal workers.

Karina greets each of the women leaning idly against a shop wall by name, handing them a pack of condoms and a pamphlet about contraceptive use. While we walk, she tells me how the police used to round up street sex workers and drive them around in a truck to humiliate them before taking them to jail, even though selling sex is not criminalised in Ecuador. She and others stopped this practice by recording police abuse on their cell phones and using the evidence to denounce them.

Karina Bravo is the founder of Flor de Azalea, a collective of street sex workers in Machala, Ecuador, and the representative of the Latin American Platform for People Who Exercise Sex Work (PLAPERTS). Flor de Azalea's mother organisation for brothel workers – the Association of Autonomous Women "22nd of June" – was the first sex workers' organisation in Latin America, founded in 1982. With at least one sex worker collective in every province of the country now, Ecuador is a hub for sex worker activism. These organisations fight to reduce stigma and improve working conditions by demanding that prostitution be recognised as work, resisting exploitative practices by brothel owners, and denouncing police abuse.

My interviews with 57 sex workers in Ecuador in the summer of 2016 revealed how organisations can empower sex workers to claim their rights as citizens and voice their objections to harmful government intervention. In Quito, sex worker leaders like María José Flores, president of Por un Futuro Mejor, interviewed for television channels and staged protests against the municipality's attempts to push sex workers out of the streets of the Historic Center. In Guayaquil, leaders met with government officials to object to limitations on brothel operating hours. Their activism challenges notions of prostitutes as victims needing rescuing. Their work, for instance, has led to major improvements in police treatment. However, support is still needed: Karina wants the government to protect sex workers' rights and provide more resources to grassroots organisations – the opposite of their current criminal treatment. Sex workers are the experts on their own lives, and their voices and desires should drive policymaking on prostitution.

Jessica Van Meir
2017, USA, MPhil Development Studies

Biography: Jessica Van Meir is a student, feminist, and proponent of sex workers' rights. Her MPhil dissertation focuses on sex workers' experiences in Argentina and Ecuador, based on interviews conducted in 2016.

WHAT IF GENDER EQUALITY COULD CHANGE THE FACE OF POVERTY?

The Bill & Melinda Gates Foundation's new strategy to target gender inequality

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The Bill & Melinda Gates Foundation has spent the past year sifting through evidence to identify barriers to equality for women, which they plan to tackle in an effort to change the face of poverty. The first-ever gender strategy by the Foundation will focus on transforming the way women participate in economies as a way to chart a better future for themselves and their families.

Sarah Hendriks, Director of Gender Equality at the Foundation, delivered this year's Gates Cambridge Annual Lecture, entitled "What If...Gender Equality Could Change the Face of Poverty?" She provided a preview of the Foundation's key findings before their official launch on International Women's Day.

Hendriks' talk detailed ways in which boosting women's economic stance could have a wider impact on social and health benefits for society, including intergenerational effects. Their work has identified 13 elements that, if addressed, are expected to have the greatest impact on gender equality. Critical elements brought forth by the study include education, paid care work, opportunities for decent work, and delayed marriage. Moving forward, the Foundation will focus on areas with the greatest potential for improving the lives of low-income girls and women.

Hendriks explained that women and girls often shoulder the burden of poverty. Unpaid care work falls disproportionately on the shoulders of women, and if this work were in fact paid, it would account for an estimated 13% of the GDP.

The caring responsibilities of girls and women also translate to a widening gap in education and employment opportunities as they age. Women were also found to have narrower social networks than men, limiting their access to economic markets and healthcare information. Furthermore, they were less likely to have bank accounts – an additional barrier to accessing capital. As a result, these women often remained in low-growth, home-based enterprises.

Hendriks hopes that by 2025, gender equality will add an estimated $11 trillion to the global GDP each year. Although many challenges for gender equality persist, she remarked that she was optimistic given the groundswell of interest in addressing gender equality as a means to improving sustainable development and reducing poverty.

Hendriks concluded with wise passion: "I am impatiently optimistic that we will have a more equal future which will unlock the potential for all people."

Mandy Garner and Sahba Seddighi

Women, work, and the American Dream

Narratives of exhaustion and exploitation

While paid work is often seen as a way to women's empowerment, we need to closely examine the work conditions into which women are propelled. Based on my research with young women in service work in Delhi, India, I argue that the exploitative conditions make women's employment unsustainable and undesirable.

"*Your sister works in the mall? She must wear pants and shirts then!*"
– Conversation with young girls at a literacy centre, Delhi

"They want people who can work silently…I'm not like this. I do what I think is right. I don't want to do the kind of work where I feel insulted, where I work hard and still can be told whatever." –

Preeti, 21, café worker in Delhi

It has almost become an axiom that women's participation in paid work has a direct positive impact on their well-being. Paid work offers them financial independence, and consequently, greater decision making power and stronger position in the family. Although there is some evidence to support this claim, my research suggests that we need a more comprehensive understanding of the conditions of women's employment. In India, where the female labour force participation rate remains dismally low (27% in 2013), opportunities offered by multinational companies – especially fast food and coffee chains – start appearing as a panacea, due to the lack of alternative stable and public employment.

In this Indianised version of the American Dream, stories of exploitation, harassment, and inequality are invisibilised. The quotes above, taken from interviews I conducted during fieldwork in Delhi, expose this tension. Merging jobs, primarily in sales, retail, and customer services, are outwardly attractive; however, experiences of young women at work show that they are far from the safe havens they are portrayed to be.

For jobs that are made attractive through the idea of "skills," the average pay is low (between Rs. 8000-12000 or 90-130 GBP per month) and growth opportunities are limited. Furthermore, contractual agreements are hardly ever maintained. For instance, it is difficult to get time off, even though women are contractually hired to work six days a week. Thus, it is no surprise that exhaustion from work emerged as a common theme in this research. Women talked about swollen feet from standing all day (with short or non-existent lunch breaks) and not being able to take time off when they were sick.

Despite the possibility of entering private service jobs, young women do not view them as sustainable careers. If India intends to encourage more women to participate in paid work, it needs to consider the future of work in the country.

Asiya Islam
2015, India, PhD Sociology

Biography: Asiya Isla is a PhD scholar in the Department of Sociology, University of Cambridge. Her research explores gender and work in urban India.

Costly Conditions

Cash transfers have gendered costs

Hidden costs of the world's favourite anti-poverty programme.

Every month, millions of women receive cash payments for taking their children to the doctor and school. These conditional cash transfers (CCTs) are the world's most popular anti-poverty programmes, currently implemented in sixty-seven countries and reaching over 135 million individuals in Latin America, alone. World Bank president Jim Kim recently praised the Peruvian CCT "Juntos," offering to finance "the Peru formula" for other countries, claiming: "CCTs help poor people. They stimulate the economy, they are a great thing to do."

While some argue that CCTs present clear benefits, certain aspects remain overlooked. For development experts, CCTs are assets that encourage poor households to overcome financial, geographical, and social barriers that prevent them from using public services. This type of narrative on development – the expert's story – draws only on service usage data to suggest that CCTs provide a cost-effective and efficient development intervention. However, a contrasting way to tell the CCT story begins with the mothers' experiences of meeting the conditions for obtaining these payments. Particularly, my ethnographic research in Andean Peru reveals hidden costs that CCT assessments routinely overlook.

In rural Peru, mothers perform extensive walking and waiting to meet the conditions for obtaining a CCT. In the absence of transportation, they trek hours with their children to the closest health clinic, only to find that they are often closed due to inadequate funding.

In addition to the lack of facilities, mothers often have to comply with additional "shadow conditions" that benefit CCT staff and other local authorities. While the labour performed by these women do not cost the World Bank, they drain their time, dignity, and agency.

On threat of programme suspension, mothers have marched in political parades, cooked unpaid for the school lunch programme, used smokeless stoves, kept a tidy house, paid for school parties, and had hospital rather than home births.

Women's walking and waiting and compliance with shadow conditions cost the Peruvian government and the World Bank nothing at all. However, they cost women time, dignity, and agency.

For many mothers, the CCT is only an *ayudita* – "a little bit of help" – in the context of an economy that does not favour rural life. While this type of conditional aid is not amenable to inclusive development, instating unconditional cash transfers and quality public services may provide a more effective alternative.

For further information and guidance on alternative solutions, I invite you to refer to my book *Unjust Conditions: Women's Work and the Hidden Cost of Cash Transfer Programmes*. University of California Press.

Tara Patricia Cookson
2011, Canada, PhD Geography

Biography: Tara Patricia Cookson is the director and co-founder of Ladysmith, a feminist venture that helps international development organisations collect, analyse, and take action on gender data.

WHEN POPULISM MEETS SEXISM

Rodrigo Duterte, the Philippines' new "strong" man

Rodrigo Duterte started a violent drug war that has led to the killing of at least 4,000 "drug suspects" by the police since July 2016. His overtly masculinist rhetoric and behaviour are unprecedented among contemporary politicians. When viewed as a discursive device, Duterte's gendered language deploys patriarchal scripts to enable specific political outcomes.

"Ma'am Leni wore a dress that was shorter than usual…but after our third meeting, I lost the view," said Philippine President Rodrigo Duterte about his Vice-President Leni Robredo, the highest ranked Opposition party member.

Duterte's crude and aggressive political language regularly attracts negative media attention, but he remains popular among Filipinos after his landslide victory in 2016. The cult of personality around Duterte is reflected in the many nicknames that his supporters have created for him: "The Punisher," "Tatay Digong," and "Father Digong," among others.

In my work, I explore the ways in which his use of gendered language builds support for authoritarian projects and stigmatises criticism against his administration.

His remarks about the irresistible attractiveness of rape victims and his public rejection of condoms as sexually unsatisfying portray him as a traditional macho man – unapologetic and proud of his sexual entitlement and desire for women, which he also frames as resistance to a "politically correct culture" that threatens male freedom. His regular references to women and children victims brutally raped and murdered by drug users produces a context that legitimises the killings in his drug war, often by representing the population as helpless and vulnerable, the drug users as violent criminals, and himself as a tough and benevolent protector.

However, his concern for women is mostly paternalistic and relies on women adhering to their culturally prescribed roles. In dealing with female political opponents, he has highlighted the Vice-President's attractiveness and repeatedly threatened to expose a vocal female opposition senator's private sex tape. These strategies of drawing attention to the physical appearance or sexual practices of female leaders are disciplinary tools in the immediate sense of silencing dissent, but also in the way they undermine the authority and agency of women.

Finally, his response to criticism from both the US Ambassador to the Philippines and the head of the Philippines' Commission on Human Rights, which consisted of derisively accusing them of homosexuality, is an attempt to cast them as weak and cowardly and allows him to define himself in contrast, as a brave leader with the political will to fight crime.

Sharmila Parmanand
2016, Philippines, PhD Gender Studies

Biography: Sharmila is a PhD Candidate at the University of Cambridge Centre for Gender Studies and holds a Gender and Development master's from the University of Melbourne.

When disaster strikes

Ensuring resilient recovery of cities

Urban disasters are on the rise as major cities become increasingly vulnerable to the perfect storm of intense urbanisation and climate-related disasters.

Cities are seen as hubs of innovation and economic activity, and the sense of opportunity and prosperity attracts many people to migrate and adopt an urban life. In many developing countries, rapid urbanisation is far outpacing the provision of adequate infrastructure and services, further exasperating issues of vulnerability, poverty, and environmental degradation.

At the same time, the prevalence and damage caused by natural disasters is escalating. Over the past 40 years, the number of climate-related disasters alone has doubled. Unfortunately, most disasters impact those most vulnerable to and least responsible for climate change.

Cities are a complex system-of-systems. Urban infrastructure systems, such as water, electricity, and transportation, function interactively to provide essential services to urban populations. However, they are also inherently interdependent, which can magnify the impacts of a disaster by creating a domino effect of disruptions. Urban water systems, for example, need electricity to power pumping stations, telecommunications systems to send and receive data for operations, and transportation systems to support a distribution network. If any of these systems is particularly vulnerable to a disaster, it can result in a cascade of failures.

Disasters, while tragic, tend to be opportunities where vulnerabilities are highlighted and governments can respond by implementing strategies that will enhance overall resilience. The aftermath of a disaster exposes weaknesses and critical interdependencies in urban systems. Without intentional reflection on the mechanisms of damage, reconstruction efforts can often recreate the same underlying pre-disaster risks and drivers of vulnerability. In contrast, by integrating resilience strategies into the recovery of infrastructural and societal systems, cities can be reconstructed with the ability to better withstand and respond to various future shocks and stresses, while still maintaining essential functions. For example, before the 2015 Nepal Earthquake, Kathmandu faced severe electricity shortages, commonly experiencing 14 to 16 hours of daily blackouts. During the post-earthquake recovery, the electricity utility has implemented a number of new demand-side management strategies, substantially reducing the supply-demand gap and improving the overall resilience of the network.

As disasters continue to strike, cities must leverage these opportunities to become more resilient and equitable, and to ensure a safer and healthier future for all.

Emma Houiellebecq
2016, Canada, MPhil Engineering for Sustainable Development

Biography: Emma Houiellebecq completed an MPhil in Engineering for Sustainable Development in 2017, during which she conducted research on urban resilience in the Kathmandu Valley. Currently, Emma works for the International Committee of the Red Cross as a Water and Habitat Engineer based in South Sudan.

THE DEVIL'S ADVOCATES

Moral and political avenues for rescuing Tasmanian devils

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Tasmanian devils are threatened by outbreaks of transmissible facial tumours. What moral obligations do we humans have to "Tazzie" devils? And how do these obligations shape the policies aimed at saving them?

Tasmanian devils have faced a sharp population decline since the mid-1990s. This is due to devil facial tumour diseases (DFTs), contagious and fatal cancers that spread between individuals. Leaving a devastating trace across Tasmania's habitats, DFTs have put the devils on the Red List of Threatened Species. This has triggered government spending on large-scale conservation experiments. Past and current practices involve (i) breeding of healthy devils in zoos and on offshore islands, (ii) major culling initiatives for animals with (even minimal) disease symptoms, and (iii) efforts to develop DFT vaccines. The aim of our collaboration is to identify the most ethical and effective avenue for conservation.

What are our obligations to save the Tasmanian devils? Despite two decades of investigation, there has been no evidence to conclude that humans are responsible for the emergence of DFTs. However, we may still have certain moral obligations to save Tasmanian devils. Why? One answer: the intrinsic value of animal species or biodiversity. Another answer: a duty to alleviate the suffering of non-human animals. And another: the importance of devils to the cultural and social identity of Tasmanians. For one or all of these reasons, we believe that we have an obligation to save the Tasmanian devils.

If we do have such an obligation, how should we uphold it? Are culling initiatives morally permissible? Indeed, should we even fund devil conservation, or step back and allow evolution to take its course, trusting that the very few DFT-resistant devils will salvage the species?

Max's PhD research is one of the first to assess a new avenue for conservation: chemotherapy. Using computational genetics, Max has identified a number of tumour mutations that play a crucial role in DFTs. He has also found that DFTs' biological mechanism and chemotherapeutic sensitivity are similar to some rare, aggressive human cancers. This is a key link to discover: Tasmanian devils could benefit from future human clinical research on cancer drugs [April issue of *Cancer Cell*].

In light of this, we have several policy options for Tasmanian devil conservation. Identifying which is best will require us to integrate evidence, animal ethics, and cultural values in a publicly acceptable way.

Max Stammnitz
2016, Germany, PhD Transmissible Cancer Genomics

Joseph Wu
2016, USA, PhD History and Philosophy of Science

Biography: Max Stammnitz is a PhD Candidate in Bioinformatics at Pembroke College. Joseph Wu is a PhD Candidate in History and Philosophy of Science at King's College. Both work on interdisciplinary projects related to cancer research.

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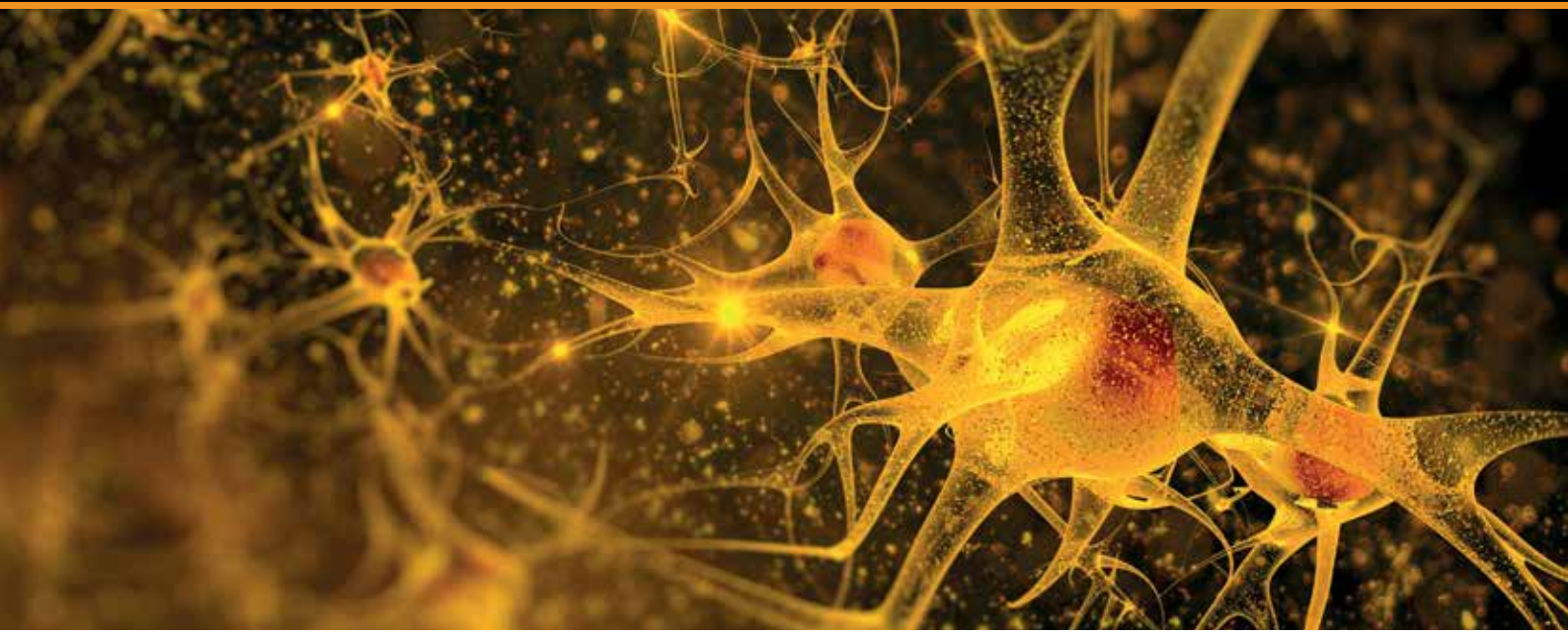
Change your mind

Neuroplasticity in focus



How do the cells in our brain adjust to changing conditions to store new information and form memories? This process is at the core of our self-concept, yet we understand surprisingly little about it.

The study of neuroplasticity – the ability of the brain to adapt – has significant implications for our development, memory, and learning. Neurons transmit signals from one cell to the next with remarkable speed, akin to data being transferred through an electric cable. To do so, they must produce various proteins that modify the propagation of signals and, in turn, allow us to think, to communicate, and to solve complex mathematical problems, among other important mental tasks. This inherent ability of the brain to change its own structure and function is the very basis of neuroplasticity, and failure of these processes is intimately linked with a wide range of psychiatric and neurological disorders.

Two approaches for studying neuroplasticity are theoretical simulations and biological experimentation. While the former can make predictions for models that are not yet available experimentally, the latter helps us ensure that our model is grounded in reality. Computational models have seen significant progress in simulating plasticity at the circuit – and even single neuron – level, but they remain limited in their ability to model neuroplastic adaptations on longer timescales. Mathematical principles – such as control theory, which considers the regulation and behaviour of dynamic systems – can be used to characterise cellular mechanisms more closely. Now, scientists at the University of Cambridge (UK) and the National Institutes of Health (USA) are working to bridge the divide between these computational and experimental approaches.

Working as a part of this team for my PhD thesis, I am interested in studying how neurons ensure that their proteins are shipped and delivered to the proper locations – a burdensome task, considering the intricacy of neural networks.

Once we have established a basic mechanistic understanding of neuron plasticity and self-regulation, our work will preclude research in many other disciplines: To help the ageing population affected by neuropsychiatric disorders, the understanding of neuroplasticity may provide novel ideas in disease treatment. In an industry where more psychiatric and neurological medicines are being prescribed each year, the mechanisms of these drugs are more important than ever. In a job market where artificial intelligence is increasingly important, appreciation of our natural intelligence is key. And, finally, for the human race, as our mental aptitude is the defining feature of our species.

Adriano Bellotti
2017, USA, PhD Engineering

Biography: Adriano aspires to apply empirical approaches and pragmatic perspectives to medicine during his MD-PhD studies. He is a first year PhD candidate.

No treatment for Alzheimer's disease has yet succeeded in modifying the course of the condition. This is in part because visible symptoms correspond poorly to the underlying disease state. By the time psychiatric evaluations recognise the tell-tale signs of dementia, neurons have often accumulated too many molecular injuries to recover.

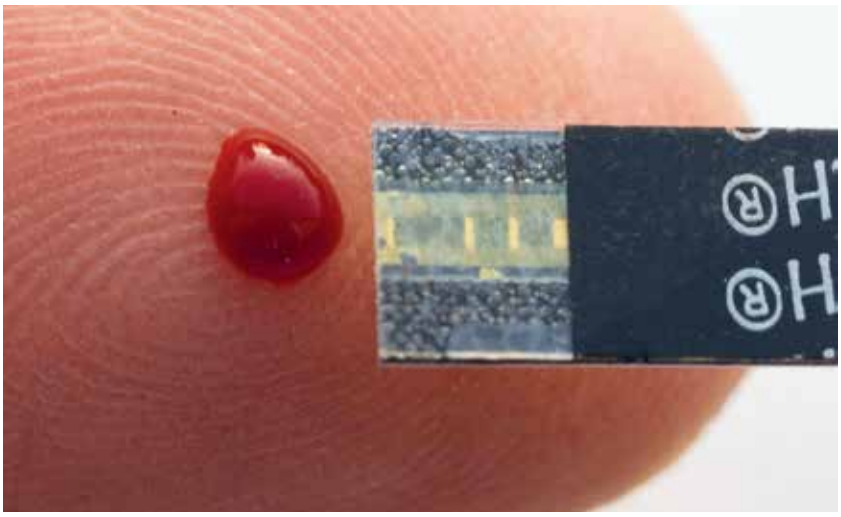
ALZHEIMER'S IN CONTEXT

Evolving definitions bring new tools

With current diagnostic tools, such as imaging and biomarker analysis, improved accuracy comes at the expense of high cost and invasiveness. For instance, Alzheimer's patients accumulate high levels of misfolded proteins in the brain, but definitive identification of these proteins requires, at minimum, a lumbar puncture. Except in the context of expensive clinical trials, suspected Alzheimer's patients rarely receive laboratory-based confirmation of their diagnoses.

For accurate Alzheimer's diagnoses to become routine in clinical settings, biomarker portfolios must be both accessible and medically informative. Cancer detection strategies, which increasingly rely on systemic indicators of a tumour's genetic composition, may provide insight on this front. Like cancer, Alzheimer's disease may also have molecular symptoms that pervade the body. In particular, the toxic protein deposits that characterise injured neurons also appear in the walls of blood vessels, even outside the brain. This supports the intriguing possibility that Alzheimer's disease, like open-angle glaucoma and some other neurodegenerative diseases, may have a broader vascular component concurrent with classical nervous symptoms.

Researchers from Boston University and Harvard are turning to the smallest of blood vessels for clues. Using microscopic capillary defects as a proxy for broader vascular changes associated with Alzheimer's, their team has shown that Alzheimer's patients exhibit systemic vascular abnormalities that are unique from non-Alzheimer's controls. These findings suggest the possibility of using microvascular structure as a non-invasive, point-of-care biomarker to support diagnoses. In combination with existing MRI systems and fluid-based biomarkers, vascular symptoms may form a backbone of the Alzheimer's detection toolkit over the next decade.



Henry Cousins
2017, USA, MPhil Bioscience Enterprise

Biography: Henry is writing his dissertation on how healthcare systems can implement new forms of personalised medicine. Prior to Cambridge, he studied molecular and clinical neuroscience.

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A study of global media coverage of Rio de Janeiro's favelas shows a difference between how international reporters and journalists from favelas report on these communities. Amplifying favela perspectives could pave the way for more nuanced understandings and productive policies.

DESTIGMATISING FAVELAS

Whose voices must be heard?

Among the world's most heavily stigmatised places are Rio de Janeiro's favelas – communities that emerged organically as low-income families built housing close to jobs. Government discourse and Brazilian media have painted these neighbourhoods as hotbeds of crime and disease since Rio's first favela formed in 1897. Movies like "City of God" and "Elite Squad" disseminated images of violence and criminality in favelas on a global scale.

Perceptions of a place always have effects beyond the realm of ideas, and stigmas of violence, poverty, and misery have served to justify policies that reproduce inequalities. This was the case for several government programmes implemented ahead of the Rio 2016 Olympics, from forced evictions and heavy-handed policing to development projects that prioritised showy infrastructure over residents' needs.

During the pre-Olympic period, however, favelas also received unprecedented international media interest. As correspondents and freelancers moved to the city, they expanded the volume and depth of coverage given to favelas, creating an opportunity to chip away at tired stigmas and pressure for more productive policies from the spotlight-hungry mayor.

I coordinated a study for Catalytic Communities, a favela advocacy NGO, to analyse how favelas were portrayed in 1,094 articles published across eight major global outlets between 2008 and 2016. In 2009, favela residents were only quoted in seven articles; in the Olympic year, however, they were quoted in 112 articles – a 16-fold increase. In this sense, the pre-Olympic media spotlight did amplify voices that have historically been excluded from mainstream media.

However, in the overall dataset, favelas were most likely to be described as sites of violence, and 46% of articles portrayed favelas "overwhelmingly negatively". In contrast, in a subset of 17 articles written by favela residents, only 12% portrayed favelas "overwhelmingly negatively". While violence was often a topic, favelas were more frequently described as places with a sense of community.

International journalists play an important role in communicating across cultures, but the Olympic media moment could have had a greater destigmatising effect had favela residents been given more space and control to tell their own stories and be heard as experts on their own neighbourhoods.

Cerianne Robertson
2016, UK, MPhil Sociology

Biography: Cerianne is the Editor of RioOnWatch.org, a Rio-based news portal run by Catalytic Communities to highlight favela resident perspectives and community solutions.

Archaeology by the people for the people

Working with local communities to protect archaeological sites

Archaeology, as the study of peoples' origin and history, provides an opportunity to form mutually beneficial relationships between archaeologists and the communities involved.

During my PhD fieldwork in the rough and hilly town of Lejja, Nigeria, between October 2016 and April 2017, a 14-year old boy asked me several questions: "Why are you interested in the past? How do you find out what happened in the past? What do you find? What can it tell you?" Similar to many of his community members, he had no idea of the significance of the archaeological materials that remain and are visible on the landscape in the area where he lives. The massive range of these artefacts in Lejja, like heaps of cylindrical slag-blocks, furnace walls, and tuyere fragments, record the large-scale intensive iron production that was carried out in this region in the second millennium B.C. Like historians, archaeologists study the past; we dig up what people in the past have left behind, and use this evidence to find out how they lived.

Community archaeology, a new practice that works to engage the local public in various interactive activities that provide them with the means to understand and reconstruct their past evolved out of a concern of low community interest and participation in many archaeological research projects. Genuine community participation is crucial for sustainable protection and development of archaeological sites, especially in sub-Saharan Africa, where the scientific value of such resources is less appreciated.

I have personally taken part in such activities by designing and delivering community-based outreach events in Lejja, Nigeria. These activities included onsite archaeological knowledge-identification of finding, training of volunteers on how to excavate and record archaeological materials, as well as local talks in the village squares and meeting halls. Participating in these events enables the community members to make discoveries about their heritage and take initiative in the preservation and protection of their cultural identity. It also provides opportunities for school pupils to develop transferable skills, such as teamwork, critical analysis, and presentation skills.

Alongside these engagement activities, over the past twelve months, there has been an improvement in community awareness, support, and participation and public protection of archaeological sites, and other archaeological resources that abound in this region. Interestingly, 40% of the school pupils that participated in the outreach activities have indicated interest in studying archaeology at the university level. Knowing this gives me a sense of fulfilment; hopefully, someday soon, we will have lots of young archaeologists from Lejja, Nigeria.

Chioma Vivian Ngonadi
2015, Nigeria, PhD Archaeology

Biography: Prior to Cambridge, Chioma was a lecturer at the Department of Archaeology, University of Nigeria, Nsukka-Nigeria. Her PhD research at Cambridge aims to identify the earliest evidence for agricultural production in Lejja, Southeastern, Nigeria.

DETERMINED TO LEARN

From a survivalist upbringing to a PhD at Cambridge

Tara Westover grew up in rural Idaho with survivalist parents. Her father's deep distrust of the government meant that she had no birth certificate, did not receive conventional medical treatment, and was not allowed to attend school.

Instead, she spent her days working in her father's junkyard or stewing herbs for her mother, a self-taught herbalist and midwife. She was 17 when she first set foot in a classroom – at Brigham Young University – teaching herself to pass the entrance exams to get there. She went on to complete her PhD at the University of Cambridge, where she studied intellectual history and political thought as a Gates Cambridge Scholar.

In February, Tara launched her memoir, *Educated*, at St John's College, at an event where she spoke to her PhD supervisor, Professor David Runciman. Her gripping book has since been widely acclaimed by the New York Times, USA Today, Vogue, and the Times, among others, and is now a #1 New York Times Bestseller. Stephen Fry, comedian, commented: "There is no feeling like discovering a young writer who is springing up fully armed with so much talent."

The February launch event in Cambridge saw Tara discussing her views on home schooling and education.

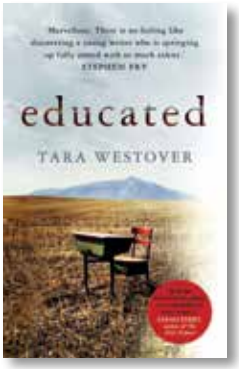
She commented that education – particularly at the university level – should be about encountering diverse ideas and perspectives that challenge preconceived views, yet it is too often about similarly-minded

She was 17 when she first set foot in a classroom – at Brigham Young University – teaching herself to pass the entrance exams to get there. She went on to complete her PhD at the University of Cambridge, where she studied intellectual history and political thought as a Gates Cambridge Scholar.

individuals gathering to decide how the world is. "University should be a place where you really experience different people. It is odd that seems not to be happening. It should not be about people reading the same texts and having the same interpretations. There should not be one dominant way of thinking about things," she said. "It should be open-ended and people should not go into it knowing what they will get out of it."

She added that university is often narrowly interpreted as being about homework, essays, or exams. "People have been misled about what education is," she said. "This myopic perception of education often discourages people and leads them to believe that they are incapable of learning on their own."

One of the positive lessons Tara's parents taught her was that she could learn anything better than someone else could teach it to her. Indeed, Tara taught herself how to write by listening to fiction podcasts and fighting against the "mythology" that surrounds literature. "People are probably capable of a lot more than they think they are," she said. "But so many people have confused the institution of education with the fact of it – they conflate the form that education most often takes with what an education is."



Tara also commented on home schooling, saying that her views on the topic vary depending on the motivation behind it: whether it is undertaken to restrict access to different views.

The discussion ranged from issues surrounding the education system to Tara's childhood experiences and how she ultimately became an independent thinker, able to challenge the views she once held.

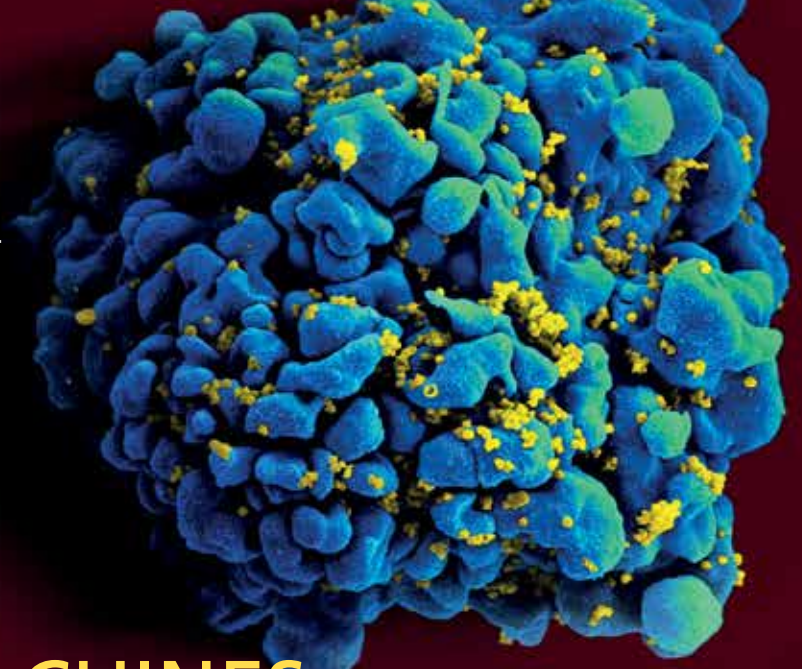
As a child, Tara took her father's opinions to heart, believing that other children were being brainwashed in the local schools. When she got to university, she struggled academically and realised there was a great deal she still did not know, but she still fundamentally believed that her father was right.

At Brigham Young University, where she completed her undergraduate education, she realised that she had access to only one view, of many, in the past. "It was freeing to have access to a lot of views. I could choose. I could make decisions. It helped me break away from my father's ideology," said Tara.

She stressed that her book is about education and family, rather than religion. Her family members were not "typical" Mormons, she said. At university, she realised that her father might be bipolar when she first learnt about the symptoms of the disorder. Her father seemed to care about safety, she recalled, but would ask his children to do things that would be considered risky and dangerous. "It's not that he didn't care about us, but Dad could not run a junkyard in a safe way. There was something about the way his mind worked that meant he wasn't able to," she said.

Tara concluded by saying that she hoped her book was not just an American story. It is currently being translated into some 20 languages, so she hopes that the themes of education and family are indeed universal.

Sahba Seddighi and Mandy Garner



Many diseases and infections, including cancer, Alzheimer's disease, and Ebola, occur because of dysfunctions in tiny biological machines within our cells. A new technique in structural biology called electron cryomicroscopy (cryo-EM) is revolutionising how we visualise them, providing a clearer view of life that may ultimately lead to more effective treatments.

LIFE'S TINY MACHINES

Cryo-EM captures life in atomic detail

The cells that make up all living things contain tiny molecular machines that carry out the tasks essential for life. These machines are made up of molecules such as deoxyribonucleic acid (more commonly known as DNA) and proteins. The challenge is to see how the atoms in these molecules connect and interact to form a functional structure. Looking at structures of molecular machines at the atomic level provides insight into their function, how disease disrupts their normal function, and may provide insight into pharmacological ways to reverse the disease. For example, by capturing a virus as it enters a human cell, we can design drugs to block viral entry and therefore prevent infection.

Traditionally, X-ray crystallography was widely used to determine high-resolution structures. However, crystallising molecules is technically difficult and large quantities of sample are required. Cryo-EM overcomes these limitations because the molecule of interest does not need to be crystallised and is instead frozen in a thin layer of ice. A beam of electron shines onto the sample, forming an image that is captured by the camera. By taking many images, biologists can see the molecule from all angles and use image processing software to create a 3-D representation of the machine.

Until recently, techniques limited cryo-EM resolution to mere blobs. With advancements in camera and microscope hardware, we can now take better images, in the form of movies, and use advanced processing software to analyse them. This has led to an exponential increase in atomic-resolution structures determined by cryo-EM. For example, scientists at the MRC-LMB, led by Dr. Goedert and Dr. Scheres, used cryo-EM to visualise, in unprecedented detail, the molecule Tau, which forms aggregates in the brains of Alzheimer's patients. In light of several beautiful structures of life's tiny machines unveiled by cryo-EM, the Nobel Prize for Chemistry in 2017 was shared by Richard Henderson at the MRC-LMB and Jacques Dubochet and Joachim Frank for their contributions to the development of the technique.

Current Gates Cambridge Scholars Elyse, Anantha, and Chris use cryo-EM in their research to study fundamental cellular processes. Elyse's research aims to visualise machines that become disrupted in cancer, Anantha studies machines that process RNA, and Chris studies protein synthesising machinery.

Elyse Fischer
2017, USA, PhD Biological Science

Anantha Kumar
2015, India, PhD Biological Science

Chris Rae
2015, USA, PhD Biological Science

Biography: Elyse is from an island in Washington, USA. She studied Biochemistry at St. Andrews University and then worked at the National Institutes of Health designing cancer therapeutics. She is now a PhD student at the MRC-LMB. Anantha is from Madras, India. He studied at Nagoya University, Japan before moving to Cambridge to pursue his PhD at the MRC-LMB. Chris is a biologist from Pennsylvania, USA with an interest in antibiotic resistance. He is a PhD student at the MRC-LMB, studying how bacteria deal with lethal problems that could be exploited as new antibiotic targets.

Looking back to imagine the future

SPAIN AND CATALONIA IN HISTORICAL CONTEXT

The movement for an independent Catalonia has never been stronger. Yet the push to create a new state is steeped in centuries of tension with Spain. Until politicians and the public come to terms with this reality, an equitable and sustainable solution to the "Catalan question" is unlikely.

The constitutional crisis in Spain sparked by the controversial referendum on Catalan independence took a dramatic turn on 1 October 2017, when some 900 Catalans were injured in altercations with national police forces. Even though the referendum was ruled unconstitutional by Spanish high courts, it drew 43 percent of eligible Catalan voters, with over 90 percent of 2.26m ballots favouring independence.

In response, Spain's central government sacked the democratically elected Catalan administration responsible for calling the referendum, arrested numerous cabinet ministers, while Spanish courts have pursued the extradition of multiple officials who sought asylum throughout Europe, including the former president of the Catalan government, Carles Puigdemont. Several months later, the stalemate between Catalan independentists and the Spanish central government is ongoing. Despite the uncertainty of the current situation, most of the international coverage of the "Catalan question" has ignored the long history of tension between Spain and Catalonia.

Originally a self-governing principality within the Kingdom of Aragon, Catalonia has endeavoured to preserve its language and culture for centuries. However, its union with the Kingdom of Castile in 1469 catalysed a gradual redistribution of cultural and political power. The Spanish language and the central national identity were prioritised at the expense of regional patriotisms. Anti-Catalanism took its most extreme form during the Spanish Civil War (1936–9) and ensuing Franco dictatorship, which sought to systematically forge a monolithic, monolingual Spanish identity. Although Spain's transition towards democracy began with Francisco Franco's death in 1975, the country has not fully come to terms with the consequences of its violent past: moving on after 40 years of civil war and dictatorship has been a piecemeal process, painful, and polemic.

As a cultural historian of modern Spain, I work to illuminate the similarities between contemporary debates in Spanish society and the discursive techniques employed over a century ago. My dissertation combines literary analysis and archival research to examine the relationship between language, education, and national identity in Spain and Catalonia. Only by grasping how the country's past continues to impose itself on the present can we appreciate the challenges being lodged against Spain's integrity as a nation-state and consider the question of Catalonia's future.

Parker Lawson
2017, USA, PhD Spanish

Biography: Parker Lawson is a PhD Candidate in Spanish at Selwyn College. He previously completed an MPhil in Modern European History and was a Fulbright Scholar to Madrid, Spain.

GATES CAMBRIDGE ALUMNI ASSOCIATION UPDATE

When Gates Cambridge scholars make their journey from Cambridge back into the 'real world', the magic feels lost. However, every Gates Cambridge scholar becomes a member of our special Gates Cambridge Alumni community.

The Gates Cambridge Alumni Association (GCAA) facilitates social and professional relationships between alumni, enabling our global community to become a strong network that works together to improve the lives of others.

The GCAA has representatives across the world that are building our network. Having just completed elections, the GCAA welcomes Alex Kong (2016) as secretary, and Ben Cole (2011), Devinn Lambert (2013) and Szilard Fejer (2005) as the Director of Membership for West Coast US, East Coast US and Europe, respectively. They join Co-chairs Rob Rivers (2003) and Rebecca Saunderson (2012), Director of Membership for Asia Pacific Anna Kendrick (2011), and Treasurer Michael Duyzend (2008).

There are many future alumni activities planned across the world, perhaps the most significant to the GCAA being the inaugural Lauren Zeitels memorial lecture, which will be held in Boston on the 2nd of June. Lauren was deeply committed to the alumni community and was instrumental in founding and building the Gates Cambridge Alumni Association and its community. Her loss has been deeply felt by the GCAA and the alumni community. This event will not only celebrate Lauren's life, but will also be a weekend full of activity where alumni can connect, network, and become integrated into the community.

The GCAA has had a successful year of events across the world, including in Hong Kong, Singapore, Shanghai, Berlin, London, Sydney, New York, Boston, San Francisco, and Washington, D.C. We were proud to partner with the Scholars' Council to have the first Global Day of Engagement in March, where our altruistic scholars and alumni dedicated time to worthy causes. We would like to see this initiative expand globally in 2019 and will focus on mobilising our talented scholars to get working on initiatives. Alumni with ties to NGOs or community organisations are encouraged to get in touch, as we would love to partner on initiatives that are significant to our community.

Importantly, our community is enriched with talented and passionate altruistic individuals and the GCAA would like nothing more than to work with you. Alumni across the region are warmly invited to host social gatherings, historical or cultural events, outreach events, lectures, professional development events, or regional symposia. Event funds and institutional support are available to make a range of events possible. We support all alumni activity, so get in touch if you have an idea or initiative – we would be glad to help.

Co-chair Rebecca Saunderson
2012, Australia, MPhil Medical Science

SCHOLAR COMMUNITY UPDATE

Our academic year is off to a successful start! New and returning scholars have come together to share their ideas and socialise in a series of exciting events in Cambridge and beyond.

Since Orientation, we have remained busy in Cambridge. In November, the annual Gates Gala, centred on the theme of "Venetian Masquerade," was marked as always by dancing, activities from casino games to silhouette cutting, and Scholars posing for professional photos in their best – this year, with masks to boot.

In February, Sarah Hendriks, Director of Gender Equality for the Bill and Melinda Gates Foundation, travelled to Cambridge to give the Annual Lecture, entitled "What If…Gender Equality Could Change the Face of Poverty?" The lecture provided a fascinating window into the Gates Foundation's plans to consider gendered aspects of poverty in all of their global programming, and it was also a wonderful opportunity to get a better look at what our 'cousins' based in Seattle do.

The first Saturday in March saw over 60 Scholars and their guests fan out around Cambridge for the annual Day of Engagement. Even though harsh winter weather meant some projects were cancelled, small groups sewed ponchos for refugees, played with local children, and transcribed interviews, among other activities.

We also enjoyed a wide range of smaller events. Scholars took advantage of periodic Internal Symposia to talk about their research in a relaxed environment (or even compete to see who could best communicate their research quickly and comprehensively to their peers, in the case of the Three-Minute Thesis event). Scholar Stories also provided a platform to talk more intimately about life experiences and journeys. Dozens of Scholars took advantage of Term Trips to travel to faux-Victorian Ironbridge Gorge, Bletchley Park, or Oxford, and many more attended plays, ballet performances, and other events in and around Cambridge. Some of these were particularly exciting, because they starred Scholars as dancers, musicians, or actors – showing off the broad base of talents within the Scholar community. There were also a number of events that mixed education and entertainment, such as a viewing of the film "Black Panther," followed by a panel discussion.

Of course, all of this excitement did not overly distract us from our academic endeavours, as fully evidenced in the rest of this issue. We greatly look forward to another year of excellence and discovery as a community.

President Margaret Comer
2015, USA, PhD Archaeology

A historian of science in the antiquarian book trade

Dr. Anke Timmermann
2003, Germany, PhD History of Science

My life with books would have been impossible without the support of the Gates Cambridge Trust.

I was studying English, philosophy, and mathematics when I first discovered the history of alchemy. Here was a part of the continuing human endeavour to eradicate diseases and poverty that had, often erroneously, been dismissed as occult or magical. Here was also a history that was largely unwritten, that would involve true source work with medieval and early modern manuscripts, and indulge my polymathematical instincts and bibliophilia. However, I had grown up in an environment where marriage and motherhood were the traditional ambitions for a girl, and my family's economic circumstances compelled me to fund my own university education. The Gates Cambridge Scholarship not only made my PhD possible, but also opened the path towards the international career in history of science at institutions both within and outside of academia that followed, eventually leading to my return to Cambridge as the Munby Fellow in Bibliography from 2013 to 2014.

In 2014, I changed direction and joined the antiquarian book trade, working at Bernard Quaritch Ltd, one of the oldest book firms in London. I became an Associate Member of the Antiquarian Booksellers' Association in 2017, and now serve as its Library Liaison officer, fostering links between librarians and booksellers. This year, I founded the antiquarian book company Type & Forme in Grantham – where the young Isaac Newton received his school education – specialising in books on science, travel, natural history, and food. Type & Forme will also be participating in Grantham's science festival, "Gravity Fields," later this year.

As an antiquarian bookseller, I have the opportunity to produce original research, to write catalogues that serve as reference works on a specific field, and to help libraries and collectors worldwide form historically significant collections. But I also continue communicating my findings, and my passion for books and history, to students and the general public. Because I learned that books can change lives. And books, and their histories, should be accessible for everyone.

From the clinic to the community

Dr. Rebecca Saunderson
2012, Australia, MPhil Medical Science

The Cambridge experience was immersive. Being a part of the Gates Cambridge community was a life changing experience, and has continually shaped who I am as a person. This unique community inspired my involvement with the Gates Cambridge Alumni Association, of which I am now co-chair, and we continue to work on initiates to bring alumni together to fulfil the ethos of the scholarship, "to improve the lives of others".

My MPhil focused on bloodstream infections caused by the bacteria Staphylococcus aureus.

On my return to Australia, I worked with refugees on Christmas Island before undertaking specialty training in dermatology, which I have completed. I am incredibly passionate about skin conditions; they profoundly impact the quality of life of individuals, but also can have dramatic consequences on a population scale. The treatment of skin is often neglected, as it may not be prioritised as highly as other health conditions. However, emphasis on dermatological conditions is essential. For example, scabies, which is a mite that infests the skin, can become infected with bacteria such as Streptococcus, which can then cause rheumatic heart disease or chronic renal disease. This led me to be involved in public health scabies eradication programs in East Timor, where we also established a teledermatology to provide remote consults. I am dedicated to complex medical dermatology and more recently have helped establish the first neurofibromatosis clinic in the world that specifically addresses the skin presentation of this disease.

In all of the spare time that I have, I have recently, following my own plight through the health system, co-founded a startup, Consentic, which standardises and improves medical consent. I also enjoy hiking, spending time with my friends and family, reading, and politics.

The loss of Lauren Zeitels in 2017 was a huge loss personally, professionally, and to the community as a whole. The inaugural Lauren Zeitels Memorial Lecture (2nd June in Boston) will celebrate her life and achievements and will execute her vision of getting alumni together by having a full alumni weekend full of activities. I encourage everyone to join in this alumni event and look forward to meeting you there.

Quest for speed

Lawrence Owusu
2007, Ghana, MPhil Computer Speech, Text, and Internet Technology

I have spent the best part of a decade looking for speed. I am not a petrolhead; neither am I an athlete. Ironically, the speed I am referring to is achieved by sitting behind a desk with a computer.

My quest has been finding the fastest way of making calculations and sending out the numbers to other computers to be used either by humans or by algorithms on these computers. This all sounds simple until you consider the fact that we are dealing with millions of computer data, millions of calculations, and millions of updates per second.

I work as a software engineer building low latency foreign exchange (FX) pricing and trading systems for investment banks in London. With the constant improvement to computer hardware, faster operating system software fuels the race between banks to build the fastest system. Simply put, the faster you are, the more money you make. In this world, we do not talk about seconds, that's too slow; a millesecond (a thousand makes a second) is also too slow; we talk about less than 10 microseconds (a million microseconds make a second)!

I am not in this only to make money for the banks, but the next time you send money from the USA to India or Ghana, for example, in any transaction that involves moving money from one currency to another across borders, you are benefitting from the best rate because of these systems. This quest is a never-ending one, and I look forward with excitement to the future.

Recently, I have been working with a small medical start up consisting of two surgeons (including a Cambridge alumnus) and another developer to build an app for fixing inefficiencies in the National Health Service (NHS) locum hiring system in the UK. Speed is not crucial, but efficiency is, as is raising the quality of tech-based solutions within the NHS. This poses different but exciting problems to solve. Moving between projects each week has had its costs and benefits – something most people already know – but at the very least, I get a constant reminder that speed is not everything.

Using artificial intelligence to combat fake news

Dr. Andreas Vlachos
2006, Greece, PhD Computer Science

I was born and raised in Greece, where I studied Computer Science during my undergraduate degree at the Athens University of Economics and Business. I then moved to the UK, where I studied Informatics at the University of Edinburgh. The Gates Cambridge Scholarship enabled me to pursue a PhD in Artificial Intelligence at the University of Cambridge. Following this, I did postdoctoral research at the University of Madison-Wisconsin, the University of Cambridge, and University College London. Currently, I am a lecturer (equivalent to US Assistant Professor) in the Computer Science Department at the University of Sheffield.

Throughout my career, I have been driven by my desire to advance science, and artificial intelligence in particular, to improve society. I have been working on natural language processing applications, as language is an important window into how we think and communicate our ideas. I have worked on a variety of texts, including biomedical research papers and newspaper articles, focusing on extracting the most relevant information to make them more accessible. Since 2014, I have been developing artificial intelligence-based methods for fact checking – a fundamental task in journalism that has gained further prominence in modern digital society.

Alongside my academic interests, I co-founded and currently advise Factmata, a company that aims to battle misinformation, combining artificial intelligence with community-based efforts. My interest in Factmata is two-fold: First, it gives me an opportunity to bring the outcomes of his research closer to the wider public. Secondly, I believe that the business model for news dissemination on online media platforms is partly responsible for the spread of misinformation. Thus, beyond research in artificial intelligence, there is a need to develop a different business model.

In this journey, I have found that there are two qualities beyond hard work and strong intellect that are essential in making progress in all fields. The first is perseverance in the face of rejections – be it academic papers, job applications, or grant proposals. The second is bringing projects to completion: great ideas are crucial, but implementing them proves their worth in the long term.

PROFESSIONAL UPDATES

Scholars and alumni from across the community share their professional activities and accomplishments.

2003

Aditi Mukherji (India, PhD Geography) will be the Coordinating Lead Author (CLA) for Water chapter of the Working Group II of the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 (AR6).

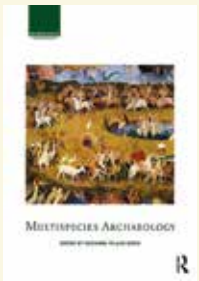
2006

Pradipta Biswas (India, PhD Computer Science) has set up an Interaction Design Lab at Indian Institute of Science, with funding from Microsoft, Faurecia, Bosch, and the Indian Science and Defence Ministries. His work is centred on developing new electronic interfaces for spastic children, military pilots, automotive drivers, and large-scale data interaction. Lab website: **https://cambum.net/I3D.htm**

Ria Collingwood-Boafo (Trinidad and Tobago, MPhil International Relations) is a Senior Research Specialist at the Directorate of Health Policy, Research, and Planning, Ministry of Health. At the Ministry of Health, she is responsible for formulating research priorities and projects to inform policies and practices for the health system in Trinidad and Tobago that are based on the application of rigorous research methodologies and the uptake of sound evidence across the global public health environment. More specifically, she develops strategies to build the capacity of policymakers and practitioners to use evidence.

2008

Suzanne Pilaar Birch (USA, MPhil and PhD Archaeology) published her edited volume, *Multispecies Archaeology*, in February 2018.



Jessica Shang (USA, MPhil Engineering) started as an assistant professor of Mechanical Engineering at the University of Rochester in July 2016. Lab website: **http://labsites.rochester.edu/shanglab/**

2009

Caroline Robertson (USA, PhD Psychiatry) is opening a neuroscience lab this fall at Dartmouth College and is currently seeking postdocs. Lab website: **www.robertsonlab.com**

Zach Watson (USA, MPhil Development Studies) is an instructor of International Affairs at the United States Military Academy at West Point and was selected for promotion to the rank of Major in the U.S. Army.

Alyssa Wilson (USA, MPhil Physics) completed his PhD in Physics at Harvard University and is now working as a Neuroscience postdoc at Princeton in Sebastian Seung's lab.

Yeo Bee Yin (Malaysia, MPhil Advanced Chemical Engineering) became the youngest member of the Selangor State Legislative Assembly in 2013 and was recently nominated to run for the Bakri parliamentary seat in the upcoming GE14 election.

2010

Mohammad Ghassemi (USA, MPhil Information Engineering) recently delivered a TED Talk, entitled "The Most Interesting Person You've Never Met," at the TEDxBeaconStreet event about a new program he started at MIT to battle social isolation.

Marie Kolkenbrock (Germany, PhD German) has published a book based on her PhD research funded by the Gates Scholarship: *Stereotype and Destiny in Arthur Schnitzler's Prose: Five Psycho-Sociological Readings* (New York, London: Bloomsbury, 2018).

Sam Sudar (USA, MPhil Neuroscience) has completed his PhD in Computer Science and is now working at Google Seattle on Chrome for Emerging Markets.

Danelle van Zyl-Hermann (South Africa, PhD History) has published an article entitled "Make Afrikaners great again! National populism, democracy and the new white minority politics in post-apartheid South Africa" in the journal *Ethnic and Racial Studies* on issues of national populism in South Africa.

2011

Kevin Beckford (USA, MPhil African Studies) has started a non-profit, called The Hustlers Guild, with two other Obama White House affiliates: **thehustlersguild.org**

Johnny Hu (USA, MPhil Biological Science) has published a paper in *Nature* entitled "Evolved Cas9 variants with broad PAM compatibility and high DNA specificity".

Edward Yapp Kien Yee (Brunei Darussalam, PhD Chemical Engineering) is working in the area of machine learning in manufacturing.

2012

Mona Jebril (Palestinian, PhD Education) published an article ("At University I Could Not Escape the Shadow of War") at the University World News calling universities to support students from conflict-affected areas, produced her first research film "Academic Life in the Gaza Strip," and won a FERSA blog entry offering advice for PhD students on how to prepare for their viva voce.

Tashfina Mirza (Bangladesh, PhD pathology) is currently working as a Research Associate at the Alzheimer's Research UK Drug Discovery Institute in Cambridge.

Brielle C Stark (USA, PhD Clinical Neuroscience) accepted a job as tenure-track Assistant Professor of Speech and Hearing Science at Indiana University.

2013

Christian R. Boehm (Germany, PhD Plant Sciences) is a Research Associate at Max Planck Institute of Molecular Plant Physiology.

Ragnhild Dale (Norway, PhD Polar Studies) has been awarded the Norwegian Critics' Association's Prize for Theatre for a production that she was involved with as Researcher and Assistant Director.

Kerstin Göpfrich (Germany, PhD Physics) was awarded a Marie Skłodowska-Curie Fellowship for a proposal on DNA nanotechnology for synthetic biology to be hosted at the Max Planck Institute for Medical Research in Heidelberg, Germany. She also founded www.ring-a-scientist.org as a platform where teachers can schedule video conferencing calls with researchers during their classroom lessons (supported by Wikimedia.de, Volkswagenstiftung and Stifterverband). All scholars are invited to create a profile.

2014

Alina Guna (Canada, PhD Biological Science) recently published a paper in the journal *Science* entitled "The ER Membrane Protein Complex Is a Transmembrane Domain Insertase" and has also won a prestigious Max Perutz Student Prize for her research.

Samuel Mosonyi (Canada, MPhil Criminology) will begin a judicial clerkship at the Ontario Superior Court of Justice in August.

2015

Dakota Spear (USA, MPhil Biological Science) has published an article entitled "Citizen Science as a Tool for Augmenting Museum Collection Data from Urban Areas" in the journal *Frontiers in Ecology and Evolution*.

Fazal Hadi (Pakistan, PhD Pharmacology) was recently elected as a Bye-Fellow at Magdalene College.

Anantha Kumar (India, PhD Biological Science) A major part of his PhD research has been published as a report titled "Architecture of Eukaryotic mRNA 3'-end Processing Machinery" in the journal *Science* (24 Nov 2017:Vol. 358, Issue 6366, pp. 1056-1059). The research focuses on structural and biochemical studies of a multi-subunit protein complex involved in pre-mRNA processing and provides new insights into the architecture and functioning of this protein machinery.

Chioma Vivian Ngonadi (Nigeria, PhD Archaeology) was awarded the Emslie Horniman Anthropological Fund and the 2017 Kathleen Hall Prize from the British Federation of Women Graduate Prize for outstanding academic excellence in recognition of her PhD project, entitled "Early Agricultural Communities in Lejja, Southeastern-Nigeria: An Archaeobotanical Investigation".

2016

Jessica Fernandez De Lara Harada (Mexico, PhD Latin American Studies) has successfully applied for funding from the Centre for Research in the Arts, Social Sciences, and Humanities (CRASSH) to form the Graduate Research Group entitled "Power and Vision: The Camera as Political Technology" for the academic year 2017–2018. CRASSH is based at the University of Cambridge, and annual competition to apply for funding is highly competitive.

Alex Kong (USA, MPhil Pharmacology) will be a researcher for the Access to Medicine Foundation starting in June 2018.

Max Stammnitz (Germany, PhD Cancer Genetics/ Bioinformatics) has been leading a collaborative project involving 11 life science PhD students and postdocs from many different Cambridge departments and colleges: PuntSeq. The team explores a revolutionary cheap and handy DNA analysis machine (an Oxford Nanopore MinION) to monitor Cam microbes. They will take surface water samples from their house river's trajectory, measure their physical-chemical properties with a do-it-yourself Arduino kit, isolate, and sequence the stream's "metagenome" DNA. Follow them on TWITTER to find out more about the Cam bacteria that regularly infect anglers, swimmers, rowers: @puntseq

Leor Zmigrod (Netherlands, PhD Psychology) has published an article in the *Proceedings of the National Academy of Sciences (PNAS)* on the cognitive roots of nationalistic identity, entitled "The Cognitive Underpinnings of Nationalistic Ideology: The Case of Brexit".

2017

Andrea Luppi (Italy, MPhil Clinical Neurosciences) will be starting a PhD in Psychology at Harvard University in August 2018.

Ria Roy (Republic of Korea, PhD Asian and Middle Eastern Studies) received the Joseph Fletcher Memorial Award in May at Harvard University for the best MA thesis written in her department.

Sahba Seddighi (Iran/USA, MPhil Epidemiology) has received a National Institutes of Health Oxford-Cambridge Scholarship and will join the MD/PhD training programme at the Johns Hopkins School of Medicine this fall.

Ben Teasdale (USA, MPhil Health, Medicine, and Society) will join the inaugural cohort of Knight Hennessy Scholars at Stanford University, where he will be pursuing an MD.

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