The next generation of soft robot integration

Grants in focus in this issue include:

- Face detection by humans
- Scaling regimes of landscapes and biodiversity
- Only what you can carry
- Disrupting representations of an ethnically diverse city
- Potential space and playing out
Director’s Note

Black Ties and Cocktails

In March a Gala Dinner was held in the impressive surroundings of the Drapers’ Company Livery Hall, City of London in honour of the 2018 Philip Leverhulme Prize Winners – pictured below.

Each year since 2001 the Trust has made the award to commemorate the contribution to its work made by Philip, Third Viscount Leverhulme, grandson of William Lever, the founding benefactor. The award recognises the achievement of outstanding researchers whose work has already attracted international recognition and whose future careers are exceptionally promising. Each prize is now worth £100,000 and thirty are awarded annually. They may be used for any purpose that advances the prize winner’s research. We know that they are keenly contested and highly regarded by the research community.

Some 140 guests – including the prize winners, their families and colleagues, together with judges, senior academics, vice-chancellors and many other prominent figures from the worlds of higher education and research – joined the Trustees and Director of the Trust to enjoy an award ceremony, and a celebratory address by Astronomer Royal, Martin Rees. This address can be found on the next page.

Professor Gordon Marshall

Scheme News

Upcoming deadlines
All deadlines are 4pm unless otherwise specified.

Research Project Grants – up to £500,000 over five years for research on a project of the applicant’s choice, to cover salary and research costs directly associated with the project. Outline applications are welcome at any time.

Next closing date for invited detailed applications: 1 September 2019

Visiting Professorships – maintenance, travel expenses and research costs for between three and twelve months, awarded to UK institutions that wish to invite an eminent researcher from overseas for an extended stay in the UK, to enhance the knowledge and skills of academic staff or the student body within the host institution. Applications are welcome at any time.

Next closing date: 10 October 2019

For full details and to apply please visit the Trust’s website www.leverhulme.ac.uk/schemes-at-a-glance
Celebratory address by Astronomer Royal, Martin Rees

“It’s a pleasure and privilege to be standing here today. Since I was introduced as ‘Astronomer Royal’, let me start with a disclaimer. I was once asked ‘Do you do the Queen’s horoscopes?’ But I had to reply that I wasn’t an astrologer, and that scientists are very poor forecasters – almost as bad as economists.

Congratulations to the prize winners – I hope that the award will help lubricate the next few years of your research career. Congratulations also to the Leverhulme Trust for funding you. There are a lot of prizes in academia. But most go to the wrong types of people – to winners who already have a lot of prizes, or who don’t need the money. Some such awards glorify the donor more than the winners.

But these awards go to the right people. It’s early-career scholars who need the boost. And they’re the individuals our universities should cherish. It would be really bad news if not enough top young talent were attracted towards academia. And that’s a worry today. Some people will become academics come what may – the nerdy element (of which I am one). But a world-class university system like the UK’s cannot survive just on these weirdos. It must attract a share of young people with flexible talent – the kind who are savvy about their options. and are ambitious to achieve something by their thirties. If that perceived prospect evaporates, such people will shun academia. And that’s a risk.

Fifty years ago, the academic profession was still growing exponentially, riding on the expansion of higher education. On university faculties, the young outnumbered the old, and the old retired in their 60s. It was reasonable to aspire to lead a group while still quite young. What’s even more off-putting is the pervasive ‘audit culture’ and the deployment of ever more detailed ‘performance indicators’ to quantify our ‘outputs’. Universities must be business-like – so must a hospital, so must a church – but that doesn’t mean they should be run like a business.

When academics extol ‘free wheeling’ research – they risk being accused of an ivory tower arrogance that disregards their obligations to the public. But they should counter such allegations. Choices of research project are anything but frivolous: what is at stake is a big chunk of our lives, and our professional reputation; not just money is being staked. It is by enabling committed individuals, like today’s prize-winners, to back their own judgement that funding agencies will best sustain high-quality and cost-effective universities. The second special virtue of the Leverhulme prizes is that they cover the whole map of learning – science, technology and engineering, but also social sciences and humanities. In a context where politicians extol scientific and technological education – the STEM subjects – it’s important to sponsor social sciences, humanities and the arts as well – not just STEM but STEAM.

These are important in our universities – but at school level too. It’s sad if citizens can’t tell a proton from a protein or are bamboozled by bad statistics. But it’s just as sad if they can’t speak another language, don’t know the history of their country, and can’t find Syria or Korea on a map. I myself have more affinity with humanistic scholars than the average scientist does, because my own research fields are pursued more for cultural reasons than in expectation of economic spin-offs.

But there should be absolutely no snobbery about ‘pure’ science. My engineering friends like a cartoon that shows two beavers looking up at a vast hydroelectric dam. One says to the other ‘I didn’t actually build it but it’s based on my idea’. Armchair theorists like me should be very modest compared to those who build things that work and meet public demand. I think our Chairman would resonate with this.

Finally, let me use the privilege of age to offer the prize-winners a few comments on how your future careers may pan out. It’s conventional wisdom that scientists don’t improve with age – that they ‘burn out’. The physicist Wolfgang Pauli had a famous put-down for scientists past thirty: ‘still so young, and already so unknown’. But I hope it’s not just wishful thinking to be less fatalistic. There seem to be three destinies for us. First, and most common, is a diminishing focus on research – sometimes compensated by energetic efforts in other directions, sometimes just by a decline into torpor. A second pathway, followed by some of the greatest scientists – Linus Pauling and Fred Hoyle are two examples – is an unwise and overconfident diversification into other fields. They over-reach themselves, to the embarrassment of their admirers. But there is a third way. This is to continue to do what one is competent at, accepting that there may be some new techniques that the young can assimilate more easily than the old, and that one can at best aspire to be on a plateau rather than scaling new heights.

But here the arts and humanities have an advantage. There are many authors, composers and painters whose last works are their greatest. But few scientists for whom this is so. The reason, I think, is that artists, though influenced in their youth (like scientists) by the then-prevailing culture and style, can thereafter improve solely through ‘internal development’. Scientists, in contrast, need continually to absorb new concepts and new techniques if they want to stay at the frontier – and that’s what gets harder as we get older.

I’ll finish on a fogeyish though not an entirely frivolous note. Some years ago I spoke at a dinner hosted by Oxford’s then Vice Chancellor to honour faculty who’d gained big grants. I reminded them that two of the most valuable pieces of intellectual property to come from Oxford did not come from scientists or engineers – but from Professors of Renaissance Literature and of Anglo Saxon. I refer of course to C.S. Lewis and J.R.R. Tolkien – whose works, decades later, earn billions for the so-called creative industries. These two distinguished scholars – both, in style and attitudes, archetype old-style Oxford dons – would feel disaffected aliens in today’s world of REF, line management, and the audit culture. Their values were the traditional ones: commitment to an institution, and to scholarship and learning for their own sake.

“We’ll all be losers if the system fails to nourish such people today. And it’s good that the Leverhulme Trust is doing so much to sustain their values and principles.”

leverhulme.ac.uk
Scaling regimes of landscapes and biodiversity

Dr Gareth Roberts
Imperial College London
Research Project Grant

Using cutting-edge modelling techniques to determine scaling regimes and their causes, Gareth Roberts will address Earth’s geological history and the drivers behind the distribution of biodiversity.

Understanding the history of life on Earth and the evolution of its topography has recently become significantly more tractable for three principal reasons. First, thanks to the efforts of the biological and geochemical communities we now have access to gigabytes of information about nearly all life and the many environmental processes that have ever been recorded on Earth. These inventories contain records of samples acquired in more than 100 years of scientific research. Detailed records of the proliferation and extinction of biota now exist for almost all of the Phanerozoic Eon (the last 541 million years).

Secondly, thanks largely to the space industry, nearly all of Earth’s modern topography has been mapped with metre-scale resolution. These data combined with even more detailed mapping using drone technology allow us to reconstruct Earth’s topography from individual riverbeds to continental scales. In some places ancient landscapes have been mapped beneath Earth’s rocky or icy surfaces and the history of Earth surface can be reconstructed from relict landforms.

Finally, rapid advances in understanding how to date, interpret and mathematically model biotic and landscape evolution, at least at large scales, have matched these advances in data acquisition and compilation. These observational and theoretical advances have changed the way we think about evolution, longevity and preservation of geological and biological processes at a range of scales. They impact our understanding of how life and landscapes respond to external processes, which is an important step towards reliably predicting the response of the solid Earth and biosphere to external pressures, for example, climate change. However, we currently lack a framework that allows us to understand how processes operating at different length scales and timescales combine to generate Earth’s history of life and topography.

In this project we will develop and apply new spectral and other mathematical tools to interpret these massive inventories of data to address two central questions. First, what drives evolution of life (e.g. speciation, extinction) on Earth? Secondly, what are the driving physical processes that govern landscape evolution?
Mapping multiculture: disrupting representations of an ethnically diverse city

Dr Katy Bennett and Dr Stefano De Sabbata
University of Leicester
Research Project Grant

Professionally generated maps don’t reflect everyday reality; Katy Bennett and Stefano De Sabbata’s project will draw upon location-aware portable devices and web technologies to map experiences, practices and emotions in a dynamic way that will bring an ethnically diverse city to life.

The goal of our project is to map places better in terms of how their ethnic and cultural diversity is lived and experienced on the ground. Sparking this project is frustration with existing maps of ethnically diverse cities like Leicester, which draw on census data to show who lives where. These maps can leave observers thinking that people live separately in ethnic ghettos, when this is not how places are experienced on the ground. The problem with this kind of map and representation is that they leak, unchallenged, into public consciousness, shaping debates and policies concerned with multicultural Britain. Leicester, with its black and ethnic minority groups shaping nearly half of its 330,000 population, has had more than its fair share of attention, including a Channel 4 documentary ‘Make Leicester British’, which focused on, and fuelled, cultural and ethnic divisions. Although Leicester is one of the UK’s most ethnically diverse places, the city is stitched into a bigger picture of Britain’s growing cultural and ethnic diversity. In 2011 20% of people in England and Wales identified with an ethnic group other than white British compared with 13% in 2001. Leicester is not particularly unique.

Our ambition is to innovatively geovisualise and map Leicester to represent how the city is experienced on the ground as people go about their everyday lives in school, work and leisurely activities. The point of the project is not to smooth over contradictions and different experiences of multicultural Leicester, but to map experience generated through our research with young people and sentiment analysis of aggregate, volunteered geographic information, collected from platforms such as Twitter, Wikipedia and Snapchat. A key motivation that underpins our project concerns attempting to creatively extend the representational capacities of Geographic Information Science (GIS) into the realms of experience and other ways of knowing.

An exciting aspect of the research involves connecting the project with GIS in Leicester-based schools. The project will also launch an annual Digital Geographies taster day at the University of Leicester with the mapping generated by the project the focal point of our work with young people. We want the project to inspire a new generation of geographers.
Collaborative exploration of the next generation of soft robot integration

Dr Fumiya Iida
University of Cambridge
International Academic Fellowship

Fumiya Iida’s research investigating the soft system–environment interactions of robots is expected to provide not only practical applications in the real world, but also a deeper understanding of embodied intelligence at large.

The human body consists of over 90% soft substances, including skin, internal organs, eyeballs, hair, to mention but a few. The fact that our bodies can physically deform plays an important role in our lives as exemplified by the heart deforming to pump blood throughout the body, or lungs deforming to inhale and exhale air. In contrast, robots, and more generally man-made machines, are built out of rigid materials such as metals and plastics. These materials are easier to design, manufacture, maintain and repair, so most of the scientific theories to date to simulate and control structures’ behaviours were developed on the basis of the rigid-body assumption. These hard machines do have benefits: they are larger, stronger, and more precise; but they pay the price of this by being heavy and can be dangerous, unlike most biological organisms. In the near future, we will need machines to be in closer proximity to humans so there is a definite need for new technologies like soft robots, but we still have a very limited understanding about how to design, build and use them.

Flexible robots have been studied for the last 20 years or so, particularly intensively in Japan, but this has only become more mainstream in the last 5 years or so, due to increased access to enabling technologies such as soft functional materials, 3D printers and high-performance computing to design and simulate the complex soft structures. With the advent of these technologies we are now able to systematically and collaboratively investigate the basic theories and applications for wider and higher-impact societal needs, such as in the medical, healthcare, agri-food and service industries. To prepare for the forthcoming fruitful period of this technology, this project explores the possibilities for the latest component technologies, such as soft sensors and actuators, and fabrication techniques, while developing a common view about the future development of this field with interdisciplinary researchers from UK, Japan and beyond.

Left and cover: soft robot hand skeleton that was used to investigate the effect of soft components while interacting with a piano. (From Hughes, J.A.E., Maiolino, P., Iida, F. (2018). An anthropomorphic soft skeleton hand exploiting conditional stiffness for piano playing, Science Robotics 3(25): eaau3098.)
Only what you can carry: nine working-class women and German cultural memory

Dr Petra Rau
University of East Anglia
Research Fellowship

How did working-class women cope with and remember Germany’s eventful twentieth-century history? Petra Rau offers a trans-generational narrative through one family’s history across 100 years.

What do Anglophone readers really know about working-class women’s lives throughout Germany’s turbulent twentieth-century history? How did they cope with hyperinflation and crushing poverty? How did their world change under fascism? What was it like fleeing the Red Army, on foot with four small children in the winter of 1944–1945? What did it feel like to be a refugee in your own country, uprooted, penniless and unwanted? How miraculous was the ‘economic miracle’ of the 1950s and what effects did Turkish ‘guest workers’ have? How did families experience being split by the Iron Curtain? What changes did reunification bring? How, in other words, do huge historical events imprint themselves on ordinary women’s lives? How are they remembered, rewritten or forgotten? How do these women tell their remarkable stories of resilience and survival? It is rare for an Anglophone audience to have access to these experiences. Oral history projects about German lives remain untranslated, and translated memoirs largely cater to British readers’ continued interests in life under totalitarian regimes, either in Nazi Germany or in the GDR. Yet most of these memoirs follow a middle-class trajectory.

This fellowship will allow me to complete an illustrated book of narrative non-fiction about nine women in my own family: factory and farm workers, servants, seamstresses and housewives. Across four generations and almost 100 years, I filter these women’s voices through a family ‘archive’ of everyday objects, official documents, photographs, postcards, magazine clippings, furniture, clothes, recipes, interviews, apocryphal ‘stories’, and one artwork. Anchored in archival research in Germany and Poland, via the study of material culture, through interviews and historical contextualisation as well as psychogeography, this book will be a hybrid narrative that self-consciously addresses the problems of reconciling personal recollection with public cultural memory.

Researching German working-class history across periods even for one (cooperating) family is difficult: wartime destruction caused material loss, and shifting borders set up linguistic barriers and archival access problems. These challenges require the researcher’s interdisciplinary agility and the writer’s nimbleness so the uncertainties in underevaluated female lives can be told with their ambivalences and occlusions. Such issues are the predictable challenges of life writing but also concern related disciplines in which women’s experiences may be under-represented: whose story do we record, and how does this selectivity steer our collective cultural memory?

Left: The marriage certificate of Martha and Otto Rau, 1930.
Potential space and playing out: exploring play, neighbours and streets

Professor Alison Stenning
Newcastle University
Research Fellowship

Alison Stenning’s fellowship explores the potential for ‘playing out’ to create a space to rethink our everyday relationships and to reanimate children’s and adults’ attachments to the people and places on their streets.

In the context of both austerity and the longer history of neoliberalism, there have been growing concerns about a rise in reported loneliness (including amongst children), a loss of shared spaces of intergenerational encounter, and a continuing decline in the quality of relationships in our everyday lives, including with our neighbours.

This fellowship focuses on the growing ‘playing out’ movement, which organises temporary residential road closures to enable neighbours to play safely and to meet, on their doorsteps. Over 800 streets in almost 80 local authorities across the UK have started ‘playing out’ and, in 10 years, the movement has grown from a small scheme in Bristol to an influential international campaign.

My research explores the potential for ‘playing out’ to remake the nature of relationships in our everyday lives, to create spaces for encounter and for tackling loneliness, and to reanimate the social and emotional geographies of the residential street.

My starting point is the idea of potential space, invoked by psychoanalyst and paediatrician Donald Winnicott. For Winnicott, the value of play rests on relationships with others who can witness the play and, in turn, playfulness creates an openness to new relationships. Critically, in the context of the erosion of social infrastructures in a time of austerity, many argue that play has the potential to remake contemporary logics of space and place, creating the potential for other, more humane and more radical experiences of urban spaces, such as residential streets.

Our streets are at the heart of our relationships with the wider world, in childhood and beyond, and are often the starting point for our journeys out into the world, literally and metaphorically. And children’s everyday play can be seen to animate streets as children occupy pavements, gardens and driveways, and move between each other’s homes, drawing adults into new relationships with the street too.

In these contexts, I ask how our attachments to our streets and our sense of belonging on them are shaped by the opportunity to play and meet on them and how, in turn, these connections can serve as a strong foundation for building important relationships within our wider communities. Pilot research that I have already carried out with streets that play out in North Tyneside identified forms of sociability that facilitated emotional, social, and material flows between neighbours and a positive reinvigoration of relationships on streets.
The importance of spatial thinking for mathematics achievement

Professor Emily Farran
University College London
Research Project Grant

Investigating children’s spatial abilities, Emily Farran and her team will identify whether LEGO® construction activities can improve mathematical skills

Spatial skills are involved whenever we need to be aware of the location and dimension of objects and their relationships to one another; they are core to everyday living, for example when giving directions or packing a suitcase. Research from our groups and others has shown that there is a strong relationship between spatial and mathematics skills; in other words, people who perform well on spatial tasks typically also have strong mathematical skills.

The association between spatial thinking and mathematics is not surprising, given the many ways that spatial skills are involved in mathematics. Mathematics requires an individual to read and understand diagrams, rearrange formulae, and to understand shape, symmetry and numerical relationships, all of which require spatial skills. Furthermore, mathematics draws on problem-solving, reasoning and interpretation skills which all require visualisation, a key spatial skill. Despite these examples of the importance of spatial skills, spatial thinking is given little emphasis within the National Curriculum, particularly when compared to the importance placed on literacy skills.

We are delighted to have been awarded funding from the Leverhulme Trust to work with primary school children to investigate the relationship between spatial skills and mathematics performance and to investigate the effects of spatial training on mathematics. Given that digital technologies are a major part of children’s everyday activities, we will determine the potential of both physical and technology-based activities to improve spatial skills.

Previous research has reported a relationship between children’s LEGO play and their mathematics skills, but we don’t yet know what processes underpin this relationship (e.g., the ability to imagine an object rotating or the memory processes required to build from instructions). Moreover, LEGO play has not previously been used to train spatial or mathematical skills. Our new research will fill these research gaps and identify how physical and digital LEGO construction activities can improve spatial skills and measure the impact that this has on mathematics ability. It will also provide us with an understanding of the impact of LEGO play on a range of mathematical skills, and provide evidence to influence educational practice, to help children develop the skills needed for careers in Science, Technology, Engineering and Mathematics (STEM) industries.

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The Second World War was fought on many fronts, but one – manned by a small unit at the BBC – has seen little recognition. Vike Martina Plock’s interdisciplinary project draws on previously un-accessed archival evidence to tell their story. Dr Carolyn Allen, of the Trust, reports...
In 1938, as Britain ramped up its war against Nazi Germany, a remarkable team of BBC staff took the fight to the airwaves. Their mission (which the Government gave them no option but to accept) was to win the hearts and minds of the German population. How members of the fledgling BBC German Service rose to this challenge, in the face of limited resources and with no experience in psychological warfare, is the subject of Vike Martina Plock’s forthcoming book, *Broadcasting to the Enemy: The BBC German Service during the Second World War*. Associate Professor of English at the University of Exeter, Vike first came across this intriguing story when she picked up a book on the Mann family: Germany’s most famous dynasty of novelists. By chance it fell open to a page on Erika Mann and a comment noting that, during the war, this outspoken critic of the Nazi regime had worked for the BBC, broadcasting in German from London. Vike’s curiosity was piqued. The more she looked for published material on the wartime BBC German-language service and the experiences of those who worked there, the more she realised that this was a story waiting to be told ... and that she was the one to tell it. A native German speaker, fluent in English, Vike also had extensive experience as a scholar of the wartime period, albeit focused on writers rather than warfare.

A Leverhulme Trust Research Fellowship awarded in 2017 allowed Vike to immerse herself in research, combining literary criticism with media history, exile studies and comparative linguistic analysis: “I went to the BBC Written Archives Centre in Caversham a lot – often reading and photographing material that had been locked away in files no one had ever opened since. That was really quite extraordinary,” she says. As she analysed the documents she’d uncovered, Vike saw that far from a faceless Corporation responding to abstract governmental directives, this was a tale of individuals who put long hours and a seemingly inexhaustible amount of energy into their task. Some were British; others had come to Britain as refugees from Nazi-occupied Europe. And while they were working, eating and occasionally sleeping alongside each other in cramped offices and recording studios, this eclectic group of different nationalities, social backgrounds and political convictions discussed – and often clashed on – how best to undermine the Nazi regime.

One of the strategies they quickly agreed upon was to clearly separate fact from fiction. In contrast to the misinformation used by Nazi broadcasters such as William Joyce – nicknamed Lord Haw-Haw – to spin messages of German invincibility abroad, the BBC German Service was to provide unbiased news, and that meant reporting allied defeats too. Their intention was to build the BBC’s reputation as a trusted news source and in this they were strikingly successful. Despite attempts to jam programmes and prosecute listeners in Germany for tuning into enemy broadcasts, the service soon became one of the most significant sources of information for people living under Nazi rule. The BBC used the news reports as bait, luring listeners to a growing selection of features, political satire and music. These programmes were vehicles for various experiments in psychological warfare and a great deal of thought was put into their development and delivery, Vike says: “BBC editors were very conscious of targeting and angling the propaganda and I think what came out particularly strongly for me was how important women were: how carefully individuals at the BBC and the government organisations involved in organising psychological warfare in enemy countries thought about their role as potential listeners.” So much so that a midday programme was produced specifically for them; although any illusion that this radical idea reflected a progressive vision of women within the echelons of the BBC is quickly shattered in the minutes of the all-male Planning and Broadcasting Committee, which met on Thursday 4th April 1940. This document records the group’s deliberations as they attempted to identify suitable topics for the proposed Women’s Programme. After first noting that this demographic is ‘well-known’ to struggle with complicated concepts, they conclude that covering women’s fashions might prove popular whereas insulting German cooking would likely not. Luckily, a woman was put in charge, and with Christina Gibson at the helm, the Women’s Programme came to include a range of sophisticated material, including surprisingly explicit details about the atrocities performed by the Nazi regime.

Despite the considerable importance of Gibson’s role, there are few biographical details to be found about her. She is not even mentioned in a recently published book on the early history of women at the BBC. Vike hopes that by highlighting Gibson’s significance – and that of the other individuals in the German Service – her book will go at least some way towards correcting the omission. “We tend to think of propaganda as something that was done by a governmental organisation – or by the BBC – but what came out particularly strongly for me was how the transmission of a single programme was very much a collaborative effort and it was the staff who worked for the Corporation who were responsible for delivering it.”
Humans are social beings. In our everyday lives, we spend a great deal of time reading information from each other’s faces. Much of this information – including the personal identities and emotional states of the people around us – is important in guiding our social behaviour.

These aspects of face perception have been a part of psychological research for over thirty years. However, one aspect of face perception has been curiously neglected, and that is the initial step of face detection. To read information from a face, we must first register that a face is present. How do we do that? Strangely, psychologists have said much less on this topic than computer scientists who are interested in modelling the process.

The purpose of this project is to characterise the mental processes that underpin face detection in humans. Several constraints are readily apparent. It is clear that we can detect faces rapidly. We also know that detection must rely on visual characteristics that are common to a wide range of faces – otherwise we would be able to detect some faces but not others. This level of generalisability suggests a role for a face template in memory, against which objects in the environment are compared. But very little is known about how such a template would operate, and how it could form. One question that we are especially keen to address in this project is whether an average of previously seen faces could make a good template for face detection.

To test this possibility, we will generate average images based on competing theories of face perception. These experiments will establish the visual characteristics of a template. They will also answer basic questions in face detection that have until now been overlooked. Does matching to an average provide a viable model of human face detection? Is there one template for face detection, or are there distinct templates for different face types?

As well as advancing our understanding of face detection, the project offers a window into fundamental principles of cognition, specifically the nature of our mental representations. One outstanding issue is how ‘smart’ our mental representations can be when it comes to changes in context. For face detection, smart operation might take account of lighting direction, which affects facial appearance in predictable ways. A related issue is how flexibly mental representations respond when confronted with an imperfect match. An ideal system would correctly match any face that has a mind behind it, while correctly rejecting any face-like patterns in clouds. Striking the right balance between hits and rejections requires trade-offs that may change from moment to moment.

Given the ubiquity of faces in social interaction, it is perhaps surprising that face detection has been abandoned to computer science. We expect that understanding face detection by humans will not only give us greater insight into human performance, but also inform future development of automatic systems.
Literary east London

Dr Nadia Valman
Queen Mary, University of London
Research Fellowship

Nadia Valman will produce the first literary history of east London – the site where key national questions such as social mobility, immigration, and urban regeneration are repeatedly contested.

From its late nineteenth-century emergence into popular discourse to the present day, London’s East End has been the subject and location of an extraordinarily rich body of literary texts. Narratives of the East End are multiple, complex and contradictory.

My project brings together literary studies with approaches to landscape, place and urbanism from human geography. I’m interested in how a focus on spatial imagination can provoke a new kind of literary history, enabling us to hear previously neglected voices and resonances among texts across conventional temporal and social categories. How have writers interpreted a built environment that was constantly transforming – from slum clearance and devastating wartime bombing to experiments in social housing, from dereliction to gentrification? How did new literatures emerge in response to the unique political atmosphere of the East End – a refuge for religious minorities, a place of radicalism and popular protest, of imperial trade and postcolonial migration? How do texts participate in making, claiming and shaping city space?

For example, I’ll be looking at urban ethnographic writing, an innovative hybrid of journalism and fiction which flourished in the second half of the nineteenth century, shaping encounters between the privileged and the poor across differences of class, religion and culture. Journalists and social investigators like Beatrice Webb and Olive Christian Malvery observed their subjects incognito, donning rags and infiltrating dosshouses and sweatshops to experience an urban landscape that was wholly unfamiliar to them. This method of investigation revealed the indignities of the lives of the poor to middle-class readers, bringing together reformist outrage, vicarious thrill and unexpected intimacy. By the turn of the century, when Jack London produced his influential expose of London poverty The People of the Abyss, a mix of memoir, statistics, photographs and polemic, the East End had become the stimulus and location for boldly experimental urban writing.

Plastic-eating microbes: engineering options for a sustainable future

Dr Tobias von der Haar
University of Kent
Research Fellowship

Plastic-based materials degrade very slowly and can persist for hundreds of years; using naturally occurring enzymes, Tobias von der Haar aims to engineer a novel, biology-derived plastic-degrading system.

As you may already know if you follow the news, plastic waste is a ubiquitous and growing problem. Plastics pollute oceans and terrestrial environments – next time you go for a walk, try to count the number of plastic fragments around you. As the environmental plastic becomes fragmented into smaller and smaller pieces, it is ingested by animals (including ourselves), with consequences that are as yet poorly understood.

Growing awareness of these issues, changing consumer behaviour, changes in the law, and technical advances in the development of biodegradable plastics have the potential to reduce or halt the additional release of plastics into the environment. However, none of these measures tackle the pollution that is already there, and many diverse and cooperative approaches will be required to deal with the latter.

Interestingly, nature herself may be contributing some potential solutions to the plastic problem. A number of recent studies have identified natural enzymes (proteins with catalytic abilities) that can degrade some plastic materials, and at least one species of bacteria has been found growing in a heavily polluted environment that can actually use plastic as a food source, albeit relatively inefficiently.

My lab’s day-job is actually in a completely different area: we study how organisms make proteins. The motivation for this research comes from various sources, including that protein synthesis is a beautiful biological process, that its malfunctioning causes medical problems, and that understanding how to efficiently re-program it underpins the multi-billion-pound biotechnology industry. The aim of my fellowship is to apply our expertise in making proteins in microbial hosts to those interesting, plastic-digesting proteins mentioned above. Our initial work has shown that plastic-degrading enzymes are efficiently produced in reprogrammed yeast cells and, moreover, that the chemical building blocks of plastics released by these enzymes can be used as an energy and nutrient source by the same cells. We are now seeking to develop novel applications based on plastic-eating microbes: for example, if we were able to connect plastic-degrading abilities to useful biological processes like biofuel production, we could potentially address two environmental problems in one go.
Left luggage: cinematic legacies of the Indian People’s Theatre movement

Dr Manishita Dass
Royal Holloway, University of London
Research Fellowship

Manishita Dass’ fellowship will result in a book-length study of the transformative impact of left radicalism on Indian film cultures of the 1940s–1960s.

My project uncovers the cinematic legacies of a vibrant left cultural movement that emerged in India in the early 1940s, under the banner of the Indian People’s Theatre Association (IPTA), the Indian Communist Party’s cultural wing. Like Popular Fronts elsewhere, the IPTA movement was based on a left-liberal coalition of writers and artists committed to using performance and the visual arts in the international fight against fascism and nationalist struggles against colonialism, social injustice and religious fundamentalism.

Unlike the theatrical impact of this avant-garde movement, its cinematic legacy has not received much attention and is viewed mainly in terms of a social realist impulse, as manifested in 1950s Bengali art cinema and often in terms of a failure, on the part of the many IPTA activists who migrated to the Bombay film industry in the late 1940s–1950s (to work as directors, scriptwriters, lyricists, composers, choreographers and actors), to make popular Hindi cinema more ‘realistic’. However, my research reveals that efforts to translate the IPTA aesthetic and values into both popular and art cinema drew not just on discourses of realism but also on the stylised modes of staging and acting (e.g. songs, dances, skits and tableaux) that were an integral part of IPTA performances.

My book will combine archival research and film analysis to trace how a collision between these modes of realism and theatricality contributed to the rise of a populist, entertainment-oriented Hindi cinema in Bombay (the predecessor of today’s ‘Bollywood’) and an alternative film culture in Calcutta, which became the matrix for the Bengali films of Satyajit Ray and Ritwik Ghatak. In addition to filling a gap in South Asian film studies, this monograph will contribute to a transnational history of Popular Front cultures and to debates about theatricality, realism, the enmeshing of leftwing aesthetics and politics and links between modernism and mass culture.

The current political situation in India (and other parts of the world), marked by the rise of authoritarian populism and religious intolerance as well as left-liberal resistance to these, gives my research, with its focus on cinematic explorations of social justice, secular humanism and anti-fascist politics, a contemporary relevance beyond academia.
## Grants Awarded between January and April 2019

### Research Project Grants

#### Sciences

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Project Title</th>
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<td>Using glaciers to identify, monitor, and predict volcanic activity</td>
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Catherine Kynnersley records that this copy of Alexander Pope's edition of Shakespeare was 'left me by my dear Mother'. Such records of gifts and legacies are common between mothers and daughters.

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Dr David Carey
Bangor University
Research Project Grant

Top: Left lateralised right handers
Bottom: Left lateralised left handers