

Research

# Horizons

Pioneering research from the University of Cambridge



Issue 23

Spotlight  
**Migration**

Feature  
**Mapping the  
Milky Way in 3D**

Feature  
**Europe's 2030  
challenges**



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**Welcome**

Migration, the topic of our Spotlight focus in this issue, seems to be rarely out of the news. Tragic stories of capsized African migrants drowning in the Mediterranean and millions of Syrians fleeing a humanitarian crisis, together with debates on the impact of immigration on the UK benefits system, have kept the topic firmly in the public eye. This attention is unlikely to be short-lived. Just as migration has shaped our global presence ever since humans walked out of Africa, it will continue to do so – violent conflict, natural disasters, economic downturns and job opportunities will continue to push and pull migrants across borders.

Migration-related research is highly interdisciplinary and, here in Cambridge, we have a thriving group of researchers who have come together to form the Cambridge Migration Research Network, pump-primed by the Vice-Chancellor's Fund. Their research is helping to build understanding of the processes of migration and its 'drivers', both today and throughout history, as well as its impact on the social fabric, and its relevance for policy and governance. The network aims to develop a framework for critically assessing current immigration policy that would have international significance.

Migration is not always forced by circumstances. In earlier times, it was also linked to the desire to explore new frontiers. In one of the articles in this issue, we hear about research on the 7,000-year-old remains of individuals who may have moved across the Sahara to trade. In another, we hear about Cambridge's contribution to exploring the ultimate frontier – a satellite which will look at the farthest fringes of our galaxy and beyond.

Other research highlighted in this issue takes us through the story of a medieval monk whose writings have changed our view of identity and Englishness in Cumbria, and technology that is enabling millions of Indian nationals to use iris recognition as a means of proving their identity. We also feature two Europe-wide studies: one that will transform the treatment of traumatic brain injury, and another that assesses the challenges Europe could meet by 2030.



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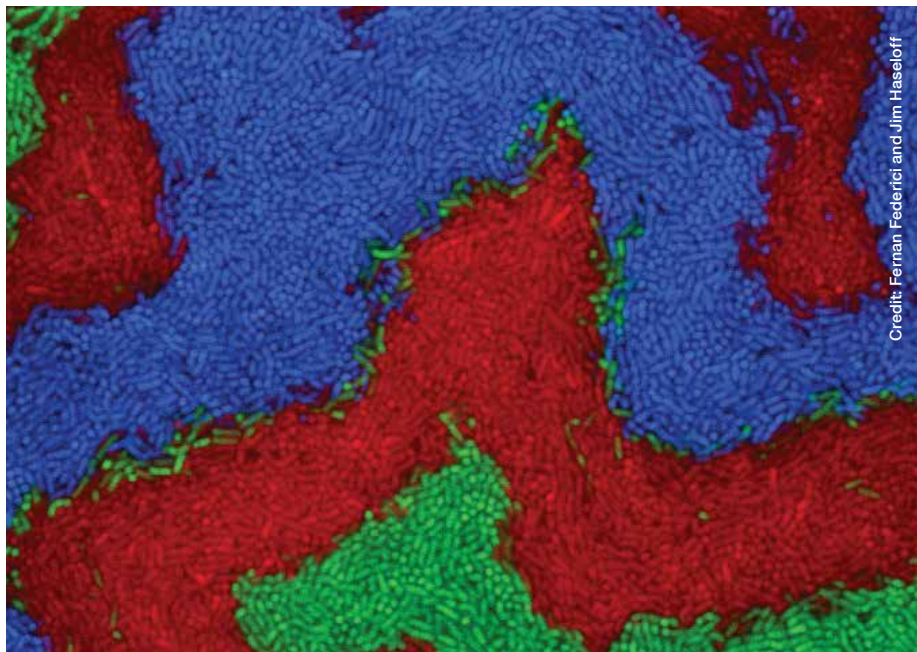
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# News



Credit: Ferman Federici and Jim Haseloff

## Greater than the sum

Big Data, Cardiovascular Disease, Public Policy and Synthetic Biology are the latest areas to join the University's portfolio of Strategic Research Initiatives.

The whole is greater than the sum of its parts might be a much-used phrase but it aptly describes the accomplishments of the University's Strategic Research Initiatives. Each of the targeted areas – ranging from energy to biodiversity and neuroscience to language science – brings together a critical mass of interdisciplinary expertise, increasing the University's capacity to address today's most pressing challenges. Now, four new Initiatives have brought the portfolio to a total of 12:

- Big Data addresses the opportunity to mine the mass of information gathered since the dawn of the digital age, with essential applications in a host of areas including government, business, science and health.

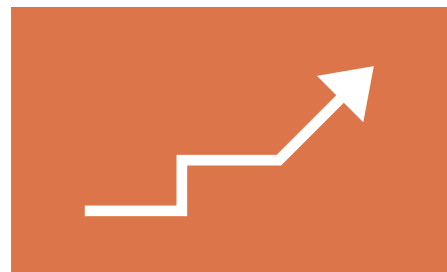


### Image

Synthetic biology techniques allow visualisation of patterns within a biofilm

- Cardiovascular Disease connects researchers working in academic departments, research institutes and clinical facilities across the University and its healthcare partners to improve the management, treatment and prevention of this deadly illness.
- Public Policy provides a focus on the policy process and on the impact that new technologies have on policy decision-making.
- Synthetic Biology applies engineering principles at the interface between the physical and biological sciences, creating the foundations for new bio-based industries through research, interdisciplinary exchange and open technologies for innovation.

[www.cam.ac.uk/research/research-at-cambridge/strategic-research-initiatives-networks](http://www.cam.ac.uk/research/research-at-cambridge/strategic-research-initiatives-networks)



## Six Centres for Doctoral Training

Cambridge has been awarded major funding to train tomorrow's engineers and scientists.

University of Cambridge academics have won six bids for Centres for Doctoral Training (CDTs), including the renewal of two that are currently running, and are partners in three further successful bids from UCL, Liverpool and Imperial College London.

The funding from EPSRC of over £30 million, spread over eight years, is targeted at areas considered to be crucial to the country's economic growth, including graphene, ultraprecision, future infrastructure, computational materials, photovoltaics and phototonics.

Cambridge Nano CDT, which now has over 500 researchers, is one Centre whose funding has been renewed. The funding follows recent investments exceeding £200 million in support of Cambridge Nano research, and new buildings for the Cavendish Laboratory. The Centre will work with companies including Nokia and Unilever to help the UK develop a lead in exploiting nanotechnologies.

The newly created Centre of Gas Turbine Aerodynamics will bring together the Universities of Cambridge, Oxford and Loughborough, along with Rolls-Royce, Mitsubishi Heavy Industries, Siemens and Dyson, and assisted by NASA and MIT. The Centre is designed to support a sector that provides 6.8% of UK manufacturing jobs and is predicted to be worth in excess of US\$1,650 billion over the next 20 years.

[www.epsrc-cdt.group.cam.ac.uk](http://www.epsrc-cdt.group.cam.ac.uk)

## News in brief

More information at [www.cam.ac.uk/research](http://www.cam.ac.uk/research)

### 18.12.13

For the first time, researchers have successfully used inkjet printing technology to print cells taken from the eye.

### 12.12.13

Discovery of how 'long-lived charges' in organic solar cells are generated, which could revolutionise materials used for solar energy.

## How large is the DNA alphabet?

Technology developed by a Cambridge spin-out company could greatly improve understanding of gene activity in cancer, embryo formation, stem cells and brain function.

The mechanisms that cause certain genes to be switched on or off – thought to play a role in cancer development and stem cell differentiation – can now be accurately detected and studied thanks to a new DNA sequencing method.

The technology which has been developed by Cambridge Epigenetix is helping researchers to understand modifications to DNA by detecting small chemical modifications – called epigenetic marks – that affect how the DNA sequence is interpreted and control how certain genes are switched on or off. These ‘extra’ DNA bases, beyond the standard G, C, A and T bases, could not be definitively identified until now.

The most-studied mark is 5-methylcytosine (5mC), which is formed when molecules of methyl attach to the cytosine base of DNA, a process known as methylation. In 2009, a ‘sixth’ base, 5-hydroxymethylcytosine (5hmC) was discovered in human DNA, and subsequently two further modified DNA bases have also been identified.

Professor Shankar Balasubramanian of the Department of Chemistry founded Cambridge Epigenetix in 2012 to develop innovative epigenetic research tools that can identify, decode and help elucidate the function of the ‘extra’ DNA bases.

“What our research group and Cambridge Epigenetix are doing is bringing this capability to go beyond the standard four letters of the genetic alphabet in a way that benefits from all the general innovation brought from ‘next generation’ sequencing technology,” he said.

“It’s remarkable that, for so long, we weren’t aware of these other modifications in human DNA. If we’ve found four more bases since 2009, then who are we to argue that nothing else is there?”



## Super-fast and super-green computing

**A pioneering high-performance computer unveiled in Cambridge will enable researchers to handle the big data challenges of the future.**

It has a performance capability equivalent to 4,000 desktop machines running at once and is the most efficient air-cooled supercomputer in the world today. Meet ‘Wilkes’ – named after Cambridge pioneer Maurice Wilkes, who built one of the first ever programmable computers in 1949.

Wilkes was designed and built by the in-house engineering team within the Cambridge High Performance Computing (HPC) Service to place the University at the forefront of “large-scale, big-data platform development.”

One of the primary uses of Wilkes is as a test bed for the development of a computing platform for the Square Kilometre Array (SKA) – a huge, international effort to build the world’s



### Image

‘Wilkes’ will develop a computing platform for the SKA

largest telescope. By detecting radio waves with unprecedented sensitivity and fidelity, the SKA facility has the potential to answer some essential questions about the universe, such as the nature of dark energy.

Cambridge is leading the design of the computational platform within the SKA, which is by far the world’s most ambitious IT project. Wilkes, which was designed in partnership with companies Dell, NVIDIA and Mellanox, and was part-funded by the STFC, Rolls-Royce and Mitsubishi Heavy Industries, will play an integral role in this design process.

“The cooling and processing systems behind Wilkes dramatically reduce the power consumption in the data centre, making the total facility one of the most energy-efficient data centres in the world,” said HPC Director Paul Calleja.

[www.hpc.cam.ac.uk](http://www.hpc.cam.ac.uk)

### 02.12.13

Study finds no correlation between violent crime and flexible alcohol licensing following the 2003 Licensing Act.

### 30.10.13

New architecture aims to make the internet more ‘social’ by eliminating the need to connect to servers.

### 17.09.13

Alemtuzumab (Lemtrada), a drug developed in Cambridge, has been approved in the EU for treatment of multiple sclerosis.

# Gaia's mission: Solving the celestial puzzle

**A** space mission to create the largest, most accurate, map of the Milky Way in three dimensions will “revolutionise” our understanding of the galaxy and the universe beyond.

Gazing into the sky on a starry night, don't be deceived by the apparent peace and tranquillity above you. The celestial ballet of stars that dance and flicker gently to the human eye are raging and burning in the near vacuum of space, living and dying with a beauty, ferocity and magnificence that is almost impossible to comprehend. The Milky Way, home to planet Earth as it sweeps around the Sun at 67,000 mph, is so vast it defies normal explanation. We know how many stars there are – more than 100 billion – because we can count them in the sky. But how do we know how far away they are, or how old, or how they differ in size and shape, and how do we know what other objects and matter make up the celestial puzzle?

At the end of 2013, a rocket blasted into the sky from a launch site in French Guiana and travelled 1.5 million km to reach its

destination in orbit around the Sun. The spacecraft is called Gaia. Its mission, funded by the European Space Agency and involving scientists from across Europe, is to make the largest, most precise, three-dimensional map of the Milky Way ever attempted.

It will be a census of a billion stars spread across our galaxy. The results, says Professor Gerry Gilmore from Cambridge's Institute of Astronomy (IoA) and the Principal Investigator for UK involvement in the mission, “will revolutionise our understanding of the cosmos as never before.”

“Our understanding of what's out there has been driven by looking at what we can see. We've never had a genuine opportunity to look at everything, to know what's there, and to know where they are in relation to each other. We don't even know how much we don't know – there are sure to be objects out there that don't even have names yet, since we don't yet realise how strange they are.”

During its five-year mission, Gaia's billion-pixel camera will detect and very accurately measure the motion of stars in their orbit around the centre of the galaxy.

It will observe each of the billion stars about a hundred times, helping us to understand the origin and evolution of the Milky Way.

Every celestial object preserves something of the era during which it was born. So, as well as mapping the sky as we see it today, the Gaia mission will allow us to look back billions of years into the past – making possible what some have called a ‘time-lapse video’ of the birth and life of our galaxy.

Scientists involved in the project also hope that Gaia will be able to detect 10,000–50,000 planets beyond our own solar system, as well as some 10,000 exploding stars, or supernovas, many before they reach their maximum brightness, providing an early warning for scientists back on Earth who wish to study them.

But it's not just those stars ablaze with nuclear fusion at their burning heart that the scientists are interested in; Gaia is also looking for brown dwarves – failed stars that never truly ignited and are left to drift across space as interstellar itinerants. And, looking closer to home, the spacecraft will provide an inventory of our Solar System's asteroids

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online



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But how do we know  
how far away they are,  
or how old, or how they  
differ in size and shape,  
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what other objects and  
matter make up the  
celestial puzzle?

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and comets, from the near-Earth Objects, to those located in the frozen furthest reaches of the Outer Solar System, the Kuiper Belt.

The sensors on board the spacecraft will be able to detect objects so faint that the human eye would have to be nearly 4,000 times more powerful to see them. "This accuracy is equivalent to measuring a shirt button on the moon as seen from the Earth," said IoA scientist Dr Floor van Leeuwen, manager of the Gaia data processing in the UK. "It means we have to have the highest-capability computers to analyse the data."

Test data will soon start streaming back to a specially built computer at the IoA and powerful clusters at four other computing centres in Europe. Within a few months, the satellite will be fully operational. Over its entire lifetime, Gaia will download around 100 terabytes of data, equivalent to 32,000 hours' worth of DVD movies.

Gilmore estimates that the first 3D maps will be ready in two years: "3D mapping involves combining complicated algorithms: we are moving, the star is moving and the stars will also be wobbling if they have planets around them. You have to process these three motions. But for the same reason, we'll be able to discover tens of thousands of planets around stars just by examining the wobble."

Perhaps as exciting as the other projected discoveries is the ability of Gaia's scientific harvest to be used to test some

of the fundamental premises of astronomy. "With Gaia, we can 'calibrate the calibrators' on which our cosmic knowledge is built," explained van Leeuwen. "If you provide a major improvement in the accuracy of the foundations in astronomy, this works its way all the way through the field for decades to come."

For example, Gaia will provide the most precise test to date of Einstein's Theory of General Relativity. Because Gaia can measure positions so accurately, it will be able to spot tiny systematic deviations in the positions of stars due to the bending of light caused by massive objects, such as our own Sun and Jupiter.

Gaia may also be able to help in the future hunt for Einstein's prediction of 'ripples' in the space-time continuum. Einstein thought gravitational waves might be able to alter the apparent positions of a group of stars, by stretching space-time. The spacecraft will help astronomers theorise on the possible strength of such ripples, which might have been created during the Big Bang itself.

"There are literally hundreds of questions like this – why is the universe the way it is? Where did the Milky Way come from? What's it really made of? Exactly how much does it weigh? How did it get to be like it is?," added Gilmore. "We will go beyond what we can see to understand reality. We are going to discover completely new things, things we would think are impossible."

<http://gaia.ac.uk>



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# The public eye?





**T**he largest biometric programme in history – collecting iris and fingerprint patterns of 1.2 billion people in three years – aims to improve the quality of life for some of India’s most disadvantaged and marginalised citizens by “giving the poor an identity.”

In 2011, the Indian government launched a massive programme to collect the iris patterns and fingerprints of all of its 1.2 billion citizens within three years. The numbers associated with the project are staggering. To date, more than 540 million people have enrolled in the optional programme, with one million more joining every day across 36,000 stations operated by 83 agencies. Each new iris pattern must be checked against every other pattern in the database to detect and prevent duplication: this equates to almost 500 trillion iris comparisons each day. Apart from its scale, what makes UIDAI (Unique Identification Authority of India) different is its purpose. It is not a security exercise or a means to control national borders, but a social development programme whose stated aim is “to give the poor an identity.”

The algorithms that make iris recognition possible have been developed in the University’s Computer Laboratory by Professor John Daugman. “If you can’t prove your identity, in the eyes of the government, you don’t exist,” he said. The algorithms, which were patented in 1994 and have been licensed to several companies around the world over the past two decades, are still the basis of all significant iris recognition deployments.

The question of whether anyone has the right to be anonymous has been debated for hundreds of years, but it is just as relevant today as it was in the 18th century. The thought of large-scale data collection by governments is a cause for concern: digital identity schemes in the UK and elsewhere have been scrapped due to questions around data protection and the right to anonymity.

But in India, anonymity is a huge problem. Just 4% of Indians have a passport, and fewer than half have a bank account – in fact, many of India’s citizens have never had any form of government identification. Without any way to prove their identity, millions of Indians living in poverty cannot access government benefits such as pensions, or subsidies for food and housing. At the same time, there is a huge problem with fraud in the benefits system – it is estimated that roughly half of all government funding spent on welfare programmes does not reach the intended recipient.

Each person who enrolls with UIDAI is issued a unique 12-digit number, known as Aadhaar. Currently, Aadhaar is a means of confirming an individual’s identity, but it will eventually be used to access a range of government and non-government services, such as passports, banking and mobile phones. Once an individual has their Aadhaar, they can open a bank account without going to a bank, giving

the government a secure place to deposit allowances and subsidies. Individuals can then withdraw money from their Aadhaar-associated account at a national network of ‘micro-ATMs’, which are often neighbourhood shops in villages and towns that do not have banking facilities. In addition to the social benefits which the project will provide, Aadhaar is seen as an important test of the effectiveness of iris recognition in large-scale identity projects.

Iris patterns have an incredible degree of random variation in their texture. The uniqueness of each pattern makes iris recognition 100,000 times more powerful than face recognition as a biometric. “Even our left and right irises are completely different from each other in detail, as are those of identical twins,” said Daugman. “You have a random, chaotic collection of features, which is why it’s almost universally regarded today as the most distinguishing biometric, as independent government tests have confirmed.”

In cryptographic protocols, the length and randomness (entropy) of the encryption key determines its strength. The same theory is at the core of biometrics. Iris recognition and other types of biometrics work by finding some unique feature of a person’s behaviour, anatomy or physical appearance that is sufficiently complex and has enough randomness to provide a unique signature.

**“If you can’t prove your identity, in the eyes of the government, you don’t exist”**

Although faces, DNA and fingerprints are all strong methods for asserting an individual’s identity, their ‘encryption keys’ are not nearly as random as those of an iris. For example, DNA cannot distinguish between identical twins, and faces do not have nearly the same degree of uniqueness as iris patterns. The overwhelming mathematical challenge of Aadhaar and other large-scale iris recognition programmes is that every new entrant to the database must be checked against each existing entrant to prevent acquisition of duplicate or multiple identities. This requires both enormous resistance to false matches and enormous speed of matching.

“When searching a database whose size corresponds to the population of India, you can’t afford for the likelihood of a false

match to be similar to that of face recognition or fingerprints: you’d be drowning in false matches,” said Daugman. “While it may be more difficult to acquire an iris image due to the small size of the target, the real strength of iris recognition is that you simply don’t get false matches, even when searching national-scale databases.”

The technology has to be able to isolate and recognise an iris, while extracting the texture and structure that make it different from any other iris. The Cambridge algorithms convert an iris pattern into a code made up of a series of ones and zeroes, which takes just a few milliseconds. The algorithms then measure the amount of dissimilarity between the new iris code and every other iris code by taking the strings of ones and zeroes and counting all the bits that disagree. An average CPU core can do around one million comparisons per second, so even when dealing with the trillions of comparisons that take place every day in India, only a moderately-sized server farm is required to search and compare against the entire database.

When computing iris codes, typically less than 70% of the iris is visible, as it is partially covered by the eyelid, or obscured by eyelashes, heavy makeup or reflections on the cornea. However, the amount of variation is such that, even so, the likelihood of two people generating iris codes that ‘collide’ with each other is vanishingly small. It is roughly equivalent to tossing a fair coin 250 times in a row and getting (say) three-quarters heads and one-quarter tails, which is extremely improbable.

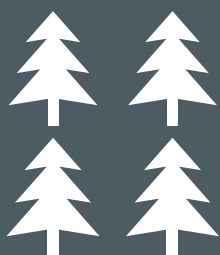
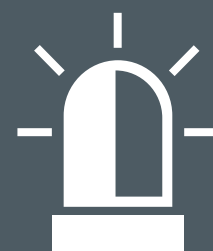
As people continue to enrol in cities, towns and villages across India, the Aadhaar scheme is being watched with great interest by governments and organisations from all over the world. While privacy concerns have been voiced, the benefits to those who cannot currently prove who they are could be enormous. The President of the World Bank, Jim Yong Kim, has described the programme as one of the best examples of integration of technology for social welfare use, and one which could play a major part in achieving the goal of poverty eradication by 2030.

“It’s very satisfying to see something that one has developed be deployed on such a huge scale,” said Daugman. “It’s also mathematically interesting to me that one can make randomness the key to the solution, rather than the problem.”



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# Helping Europe to AUGUR well



**A**n international research study focusing on the challenges Europe might face by 2030 will publish its full report in March. Here, its co-leader, Lord Eatwell, describes two future scenarios – the current approach the report describes as ‘muddling through’, which will lead to low growth and rising unemployment and, an alternative possibility, ‘regionalism’.

The very idea of policy suggests an ability to act. Yet, at a time when global risks – financial, technological, environmental and even biological – have increased, the liberalisation and integration of world economy and finance have reduced the powers of the nation state.

This lessening power of the state has not been associated with an increased power of multinational treaty organisations. Even the obvious counter-example of the European Union (EU) has seen its collective authority reduced by an upsurge of nationalism in response to the Eurozone crisis.

Today, a complex mixture of international institutions, nation states, companies (national and multinational) and various manifestations of civil society define a structure of governance that reacts to, and acts upon, major economic and financial trends, shaping them and being shaped by them.

How might present and conceivable structures of governance respond to the challenges that lie ahead for Europe? What can be done about the current dismal medium-term outlook?

In 2009, the EU-funded AUGUR project began a process of taking stock of a wide range of policy concerns – growth, employment, financial stability, technological change, energy and sustainability, demographic shifts and migration, welfare and income distribution – to analyse Europe’s prospects to 2030. The collaborative project brought together researchers from seven European institutions, including Cambridge’s Centre for Financial Analysis and Policy.

## “Underlying problems of government debt, financial instability, regional depression, unemployment and aging populations remain unresolved”

One of the major challenges in policy making is consistency between a wide range of objectives and tools. For example, are policies on the economy, energy, immigration and social security in conflict or mutually reinforcing? The aim of the AUGUR project was to develop and test a tool for policy evaluation, consisting of protocols for the specification of policies in the various areas, together with the ability to impose consistency on those policies in the context of various governance scenarios. Two particularly likely scenarios are ‘muddling through’ and ‘regionalism’.

Muddling through refers to a global environment in which the pressures of recent years, most notably the accumulation of debt, result in shrinkage of the role of government in the economy. According to this scenario, although international bodies propagate financial regulatory initiatives, the G20 fails to deliver the fundamental global regulatory reform that might provide a degree of stability. In addition, although there are some initiatives dictated by growing environmental risks, the retreat from multilateralism evident since the 1970s generally continues.

Muddling through conveys the ethos of damage limitation that characterises efforts to deal with the fiscal and financial problems that beset the Eurozone. The typical response to a potentially mortal crisis has been the application of sticking plaster at the last moment. Since the end of the crisis is not yet in sight, it appears possible that the current style of political plays and institutional adjustment could persist for many years to come. Yet, although the EU and Eurozone may remain intact, underlying problems of government debt, financial instability, regional depression, unemployment and aging populations remain unresolved. Fiscal austerity erodes public services, diminishing solidarity hitherto sustained by the state. Voters look for national solutions but national governments are unable to deliver.

In this context, GDP growth in Europe can be expected to remain at an average of no more than 1% a year in the long term and employment rates, which had been rising gradually before the crisis with increased numbers of women and elderly people in work, may fall. At the same time, continued

financial integration within Europe, and between Europe and the rest of the world, is resulting in increasing cross-border liabilities even if levels of government debt are eventually brought down relative to GDP. Fiscal austerity may have to be maintained in the long run, with government services making a negative contribution to growth of aggregate demand and, in the context of very low growth, this is unlikely to be offset by a sustained upsurge in investment spending.

A possible reaction to these dismal prospects provides the foundation of a second scenario. In an attempt to recover some means of effective policy making, the development of ‘regionalism’ at the world level provides some relief from the impotence of unfettered globalisation.

In this scenario, regional institutions and policies adopted by neighbouring groups of countries in each part of the world supplement attempts at universality by the International Monetary Fund, the World Bank, the United Nations and other global bodies, and foster a degree of internal cohesion as a basis for improved security and economic opportunities in member states.

In North America, Europe and East Asia, regionalism as a political programme is matched by relatively high levels of trade, cross-border investment and financial cooperation. In other parts of the world including South America, Africa and the rest of Asia, where political divisions and economic realities are less favourable, regional integration remains a longer-term goal and the main avenues for international cooperation are relationships with the three major regional groupings.

In principle, effective regional cooperation in the areas of trade and investment, exchange rates, monetary policy and government finance has the capability to strengthen economic growth within each region. If Europe can recover its ability to promote internal growth and convergence of productive potential in lagging regions, a substantial improvement in economic performance is possible to 2030. This is a big ‘if’, as regionalism would require not just the introduction of eurobonds to tackle financial issues, but also active measures to rebalance competitiveness throughout Europe. Regionalism also improves economic prospects in North America and to a lesser extent in East Asia.

Other parts of the world could benefit from the higher world commodity prices associated with higher growth, but risk some loss of markets to the extent that regionalism replaces multilateralism and the leading regions give preference to internal trade and investment. Regional cooperation may reduce economic risks for many countries but will not necessarily contribute to the resolution of long-term global issues such as climate change and carbon lock-in or development problems in low-income countries. To deal with these issues, a multilateral approach is necessary.

A clear (one might say, obvious) result of the exercises outlined by the project is that a fundamental rethink of European economic organisation is necessary, whatever happens elsewhere. Muddling through, the current

‘strategy’, can lead only to 20 years of low growth and rising unemployment, with accompanying political risks. The core of the rethink must be to find a way of reconciling the economic integration of European markets with diversity of economic performance – phenomena that current Eurozone structures have notably failed to reconcile.

Two scenarios yield significant improvements in performance. The first consists of a movement towards a federal Europe, with an enlarged unified federal budget and significant transfers to sustain demand throughout the Union. The second eschews both transfers and a centralised budget, but instead derives macroeconomic balance from managed variation in exchange rates, with stability sustained by an all-EU commitment to the financial variable geometry.

Actually implementing either of these situations would be fraught with extraordinary economic and political difficulties. But when compared with the results of muddling through, the challenge of choosing a new future does not appear quite so costly.

Whether these scenarios are deemed reasonable is a matter for debate. Those who reject them can put forward their own governance and policy proposals for assessment within the AUGUR test-bed. The overall goal is to enhance the consistency of policy and to provoke debate.

*The results of the study will be published in March 2014 as Challenges for Europe in the World, 2030, edited by John Eatwell (President of Queens’ College Cambridge), Terry McKinley (School of Oriental and African Studies, London) and Pascal Petit (University of Paris).*

## “The typical response to a potentially mortal crisis has been the application of sticking plaster at the last moment”



**I** Lord John Eatwell  
Queens’ College Cambridge

# Headland history



Image  
Illuminated initial from the Coucher  
Book of Furness Abbey



**T**he medieval monk Jocelin of Furness has been little studied by historians. Now a project investigating his work and its context is transforming what we know about past cultural identities in England's north-west.

Jutting out from the edge of the Lake District and home to a proud industrial heritage, the Furness Peninsula seems to weld together many of our contrasting ideas about what Englishness means. To the north lies some of the country's most outstanding areas of natural beauty; at the southern tip sits a shipyard where nuclear submarines for the Royal Navy are built. The area is defined by working-class values, post-industrial decline and 21st-century regeneration. By uniting these elements, Furness appears to epitomise many of the complex ideas behind a notion of England that is both very modern, and very old.

But this, it turns out, is far from the complete picture. In a recent project, historians have begun to scratch the surface of a much earlier period in Furness' past – one that not only changes what we know about its history, but also raises questions about these very ideas of Englishness itself.

For hundreds of years, it appears, this corner of the country was influenced as much by Irish, Manx and Scandinavian cultures as it was by the Anglo-Saxon, and then Anglo-Norman, kingdoms that stretched from the Channel to the Scottish border. Various populated by speakers of English, Norse, Gaelic, Brittonic and French, Furness is unlikely to have always identified itself solely with what we now call England. Politically and culturally, its centre of gravity was quite often a complex network of communities clustered around the edges of the Irish Sea.



This different vision of Furness has the potential to change our view of how social identities and loyalties were formed not just there, but in medieval England as a whole. Why, though, have historians focused specifically on this obscure Cumbrian headland? The answer lies with a monk called Jocelin, who so far as we know was active between 1175 and 1214, and spent most of his life at Furness Abbey. Although now just a ruin outside the town of Barrow, in its heyday, the Abbey was one of the most powerful Cistercian monasteries in England.

Jocelin of Furness was a writer of saints' lives, and one of the most significant writers to emerge from north-west England during the Middle Ages. His little-studied legacy poses an interesting conundrum: all four of the major *Lives* that he wrote are linked to the Celtic world, but were written when divisions between Anglo-Norman England and the Celtic realms (Scotland, Ireland and Wales) were supposedly very distinct. Indeed, recent histories of medieval Lancashire and Cumbria stress that this was a time when English royal government began to dominate and define the region.

If so, it is curious that Jocelin was so interested in, and conversant with, the Celtic world beyond. With this in mind, researchers embarked on a project in 2010 that aimed to understand more about Jocelin and the context in which he worked. 'Hagiography at the Frontiers: Jocelin of Furness and Insular Politics' was a joint project carried out by Dr Clare Downham and Dr Ingrid Sperber from the University of Liverpool and Dr Fiona Edmonds from the University of Cambridge, and was funded by the Arts and Humanities Research Council.

As part of the initiative, Edmonds, based at Cambridge's Department of Anglo-Saxon, Norse, and Celtic, carried

out a study which pieced together cultural interactions around the Furness Peninsula, using the evidence of place names, personal names, administrative documents from Furness, the history of the Abbey, its offshoot 'daughter-houses' and Jocelin's work itself.

"Typically this is a time when there is supposed to have been a strong distinction between the Anglo-Norman kingdom in which Jocelin lived and the Celtic world," Edmonds said. "In fact, the history also involves deeper connections with Gaelic-Scandinavian communities in places like Ireland and the Isle of Man. These were still relevant in Jocelin's own time."

Her work presents a picture of ongoing cultural fluidity in Furness which pre-dates the Norman invasion by hundreds of years. For example, in the 7th century, when Furness was part of the Anglo-Saxon kingdom of Northumbria, it is possible that there was an enclave of people speaking Brittonic – the language of the Celtic Britons. Local place names like Leece and Roose have Brittonic origins, and it may be no coincidence that Jocelin himself stressed the Brittonic links of some of the saints whose *Lives* he wrote.

During the Viking age, archaeological finds such as the Silverdale Hoard (found on Morecambe Bay in 2011) suggest a distinctive 'Hiberno-Scandinavian' culture. This fits with the intermittent link that the Scandinavian rulers of York and Dublin attempted to forge between the two cities during the 10th century in particular. Lying in between, England's northwest would have been of great strategic importance. Coinage, jewellery, grave goods, stone monuments and place names all point to Norse settlements and staging posts in the Furness area. It may even be that the local nobility was, at times, subject to powerful Norse rulers who dominated the Irish Sea from points such as Dublin and the Norse-Gaelic-ruled Kingdom of Man.

This cultural hybridity does not seem to have disappeared with the coming of the Normans. In the *Domesday Book* of 1086, the entry for the territory between the Ribble and the Esk is noteworthy because, unlike other parts of the country, it has not been divided into hundreds or wapentakes, the standard regional subdivisions used by the royal administration. The implication is that this regime was not fully imposed; certainly, landowners recorded around this time still exhibit a variety of Old English, Old Norse and Gaelic names.

Very strong links with the Isle of Man, in particular, probably remained in place for the next 200 years. In the 12th century, the Abbey established a daughter-house on Man – an unusual event because, by this stage, Furness Abbey was itself the daughter-house of the Norman foundation at Savigny. During the civil war between Stephen and Matilda, the Peninsula fell under the rule of the powerful Scottish king, David I. Meanwhile, Wimund, Bishop of Man and the Isles, launched attacks on the Scottish kingdom, and he was appeased by a grant of the Furness Peninsula.

So by Jocelin's own time, although Furness was officially part of the county of Lancashire and the kingdom of England, it seems that its cultural make-up was not so straightforward. If its elite was firmly Anglo-Norman by this stage, the identity of other people living there was less clear cut. Documents from the time reveal insular names among the local freemen, such as Gilmichel (Gaelic), Suanus (Old Norse origin), Waltheof (Old Norse) and Ailsa (Old English). At ecclesiastical sites on the Peninsula, like Conishead and Pennington, archaeologists have found Old Norse runic inscriptions. It may be that both Norse and Gaelic were still spoken. Jocelin himself was certainly able to deal confidently with Gaelic place names and personal names in his work.

Although Furness was officially part of the county of Lancashire and the kingdom of England, it seems that its cultural make-up was not so straightforward

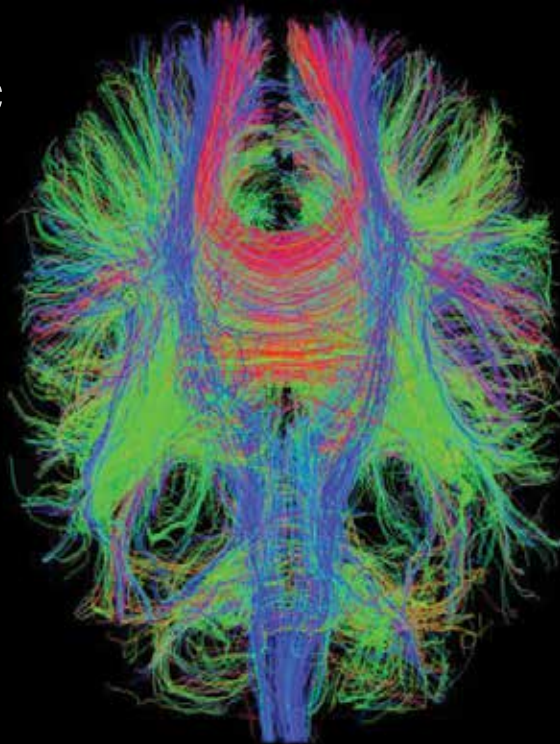
In the end, Edmonds is careful about the implications of this six-century survey. "The Irish Sea link should not be over-emphasised at the expense of links to the rest of England and the Continent," she writes. But they are also not mutually exclusive. At a time when historians have traditionally perceived the affirmation of Anglo-Norman England, Furness was a place with international contacts reaching from Scandinavia to Normandy. Beyond those who ruled, ordinary people may never have stopped looking west, where ties with those living on, and across, the Irish Sea survived.

[www.liv.ac.uk/irish/Hagiography/index.htm](http://www.liv.ac.uk/irish/Hagiography/index.htm)



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# Head first: reshaping how traumatic brain injury is treated



**T**raumatic brain injury affects 10 million people a year worldwide and is the leading cause of death and disability in children and young adults. A new study will identify how to match treatments to patients, to achieve the best possible outcome for recovery.

The human brain – despite being encased snugly within its protective skull – is terrifyingly vulnerable to traumatic injury. A severe blow to the head can set in train a series of events that continue to play out for months, years and even decades ahead.

First, there is bleeding, clotting and bruising at the site of impact. If the blow is forceful enough, the brain is thrust against the far side of the skull, where bony ridges cause blood vessels to lacerate. Sliding of grey matter over white matter can irreparably shear nerve fibres, causing damage that has physical, cognitive and behavioural consequences. As response mechanisms activate, the brain then swells, increasing intracranial pressure, and closing down parts of the microcirculatory network, reducing the passage of oxygen from blood vessels into the tissues, and causing further tissue injury.

It is the global nature of the damage – involving many parts of the brain – that defines these types of traumatic brain injuries (TBIs), which might result from transport accidents, assaults, falls or sporting injuries. Unfortunately, both the pattern of damage and the eventual outcome are extremely variable from patient to patient.

“This variability has meant that TBI is often considered as the most complex disease in our most complex organ,” said Professor David Menon, Co-Chair of the Acute Brain Injury Programme at the University of Cambridge. “Despite advances in care, the sad truth is that we are no closer to knowing how to navigate past this variability to the point where we can link the particular characteristics of a TBI to the best treatment and outcome.”

This matching of therapy to the patient is known as personalised medicine. “There are many treatments that show promise. But what we’ve learned from clinical trials is that it’s unlikely any particular intervention is going to be effective in all patients. We need instead to be thinking about customised healthcare based on knowledge of which treatment works best for whom and under what circumstances,” he added.

Now, a project led by Menon in the Department of Medicine, together with Professor Andrew Maas of the University Hospital Antwerp, Belgium, aims to provide the evidence on which to base best practice treatment. With funding of £25 million from the European Union, more than 60 hospitals and 38 scientific institutes are participating in the Collaborative European NeuroTrauma Effectiveness Research in TBI (CENTER-TBI) project. In total, data will be collected for 20,000–30,000 patients, including extremely detailed data for over 5,000 patients.

“We need collaboration on this sort of scale to characterise TBI as a disease and to identify the most effective clinical interventions,” explained Menon. “The burden

incurred by TBI provides a strong medical, social and economic imperative to motivate this concerted effort. Similar projects in Asia, Australia and the USA are also now beginning, so we will eventually be able to collapse all the databases together and undertake incredibly statistically powerful analyses.”

TBI affects an estimated 10 million people worldwide every year. In India alone, one person dies every 10 minutes as a result of TBI. Survivors can face a lifetime of disability, ranging from dizziness and reduced coordination to cognitive and behavioural problems that are severe enough to require full-time care. In the USA, the annual burden of TBI has been estimated at over \$60 billion, with disability-related costs outweighing medical costs by a factor of four. Even mild cases of TBI – many of which go undetected because they are not treated in hospital – can result in problems with concentration and behaviour.

Moreover, epidemiological data suggest that, having suffered a TBI, the chance of developing dementia later in life increases by 2- to 4-fold, or 10-fold if the patient also has a genetic predisposition. In 2013, the US National Football League (NFL) settled a concussions lawsuit for \$765 million after dozens of former NFL players developed degenerative brain diseases, believed to be caused only by repeated head trauma.

For the past 15 years, Menon and colleagues such as Professor John Pickard have been investigating the mechanisms involved in TBI. “We discovered that patients whose injuries may have been classified as

“There are parts of the brain that make us who we are, that retain memories of our life and allow us to go forward. Injuries here change the person you are”



#### Image

Compared with a normal brain (left), the number of white matter fibres in the brain following a traumatic brain injury (right) can be severely reduced

being similar had very different underlying brain pathologies,” said Menon. “We also found evidence of delayed effects, where structural abnormalities only appeared days or weeks later.”

“This attempt to identify different patterns of TBI that may have differing prognoses and therapy requirements chimes well with the evolving notion of precision medicine, which seeks to provide greater clinical differentiation of different disease trajectories,” he added.

Menon was the first Director of the Neurosciences Critical Care Unit at Addenbrooke’s Hospital in Cambridge. There, patients with TBIs are finely monitored to make sure that their blood pressure, O<sub>2</sub> and CO<sub>2</sub> levels are kept constant – even tiny fluctuations can spell further damage and even death.

“However, this is an example of where we don’t fully know the extent to which a procedure like this helps. Peter Hutchinson, NIHR Research Professor, is currently leading a trial from Cambridge to look at this question, and these data will be fed into the CENTER-TBI project.”

Other recent research has been looking in fine-grained detail at changes that happen in the brain following TBI. Work with Dr Alasdair Coles in the Department of Clinical Neurosciences has shown that some patients ‘autoimmunise’ after TBI, developing antibodies against their own brain cells. “We don’t know why or what consequences this might have – it could be protective or it could add to the inflammation and swelling,” said Menon. “If we know that

autoimmunity is associated with the patient having a good or bad recovery then we can intervene to initiate or prevent the process. If it turns out to be protective, there might even be a case for vaccinating after a TBI to kick-start autoimmunity.”

Similarly, working with Dr William Stewart in Glasgow, and colleagues in Pittsburgh and Paris, Menon’s team has been looking at the build-up of a brain peptide called beta-amyloid, commonly associated with the development of Alzheimer’s disease. Following TBI in some patients, amyloid deposits in the brain can appear within 48 hours of injury and, although these deposits are cleared over weeks to months, their role in worsening brain injury remains uncertain. “We want to know whether this build-up is associated with white matter loss, and whether early intervention might reduce the chance of developing dementia,” said Menon. Intriguingly, the collaborating group in Glasgow has shown that patients who survive a previous TBI can show a recurrence of amyloid deposition in later life.

Menon highlights behavioural changes as one of the most invidious aspects of TBI. “There are parts of the brain that make us who we are, that retain memories of our life and allow us to go forward. Injuries here change the person you are, which can have a massive impact on families.” Professor Barbara Sahakian in the Department of Psychiatry has been looking at the neuroanatomical basis of impulsivity – one of the behavioural changes frequently seen following TBI. If the researchers can identify which parts of the brain are involved, there may be

treatments to prevent some of these longer-term effects.

These research studies, together with the wider activities of the CENTER-TBI collaborating centres, will provide an unparalleled opportunity to refine both the clinical characterisation of an injury and provide individually targeted care. “You could say that the basic concept of the new project is to exploit the variability inherent in TBI,” said Menon.

“There may be over 100 interventions we could do at the moment but none is uniformly protective, so we don’t know how hard to try with them and it may even turn out that some do harm. If we can refine characterisation of the injury and determine which clinical interventions are effective to treat those characteristics, this study could benefit millions of people.”



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## Things Biographies in bone



Images  
Some of the items in the collection



Film & feature article  
available online

**T**he diet and journeys taken by those who lived in the Sahara Desert thousands of years ago are being revealed through analysis of their teeth and bones.

Skeletal remains hold clues to the behaviours of individuals long gone. Locked in their teeth and bones is information that reveals how they lived, such as the food they ate and the distances they travelled.

Dr Ronika Power and Dr Marta Mirazon Lahr from the Leverhulme Centre for Human Evolutionary Studies (LCHES), whose Duckworth Laboratory houses the remains of 18,000 individuals, are working with Dr Tamsin O'Connell from the McDonald Institute for Archaeological Research to read these 'biographies in bone'. Their work has focused on a group of 120 pre-Dynastic Egyptians who lived around 5,000 BC, and whose remains are now in the Duckworth Laboratory.

The researchers are measuring the levels of chemical entities called isotopes in the remains. Biological tissues are reservoirs for elements like carbon and oxygen, which arrive in the body from food and the environment. Tooth enamel is formed in the very early years of life and the chemical fingerprints within it don't change throughout life, so teeth can

be used to determine the geographical area where individuals spent their childhood, and the food and drink they consumed there. Because bone is 'remodelled' throughout life, its isotopes tell you where the person was living in the years leading up to their death.

The researchers are using isotope 'signatures', together with skull shape, to look for evidence of migration. "No other study has ever comprehensively tested the pre-Dynastic Egyptians with the sort of scientific protocols we are applying here. Without these biological testimonies, we have little to no idea about the extent to which mobility characterised the processes of state formation," explained Power.

"The information will open up questions about the movement of individuals, ideas, knowledge and material culture at very early stages of civilisation."

**The Duckworth Laboratory in the Department of Archaeology and Anthropology's LCHES holds human and non-human primate skeletal remains and is one of the world's largest repositories of skulls, skeletons, death masks, mummies, hair bundles and blood samples.**

[www.human-evol.cam.ac.uk/duckworth.html](http://www.human-evol.cam.ac.uk/duckworth.html)



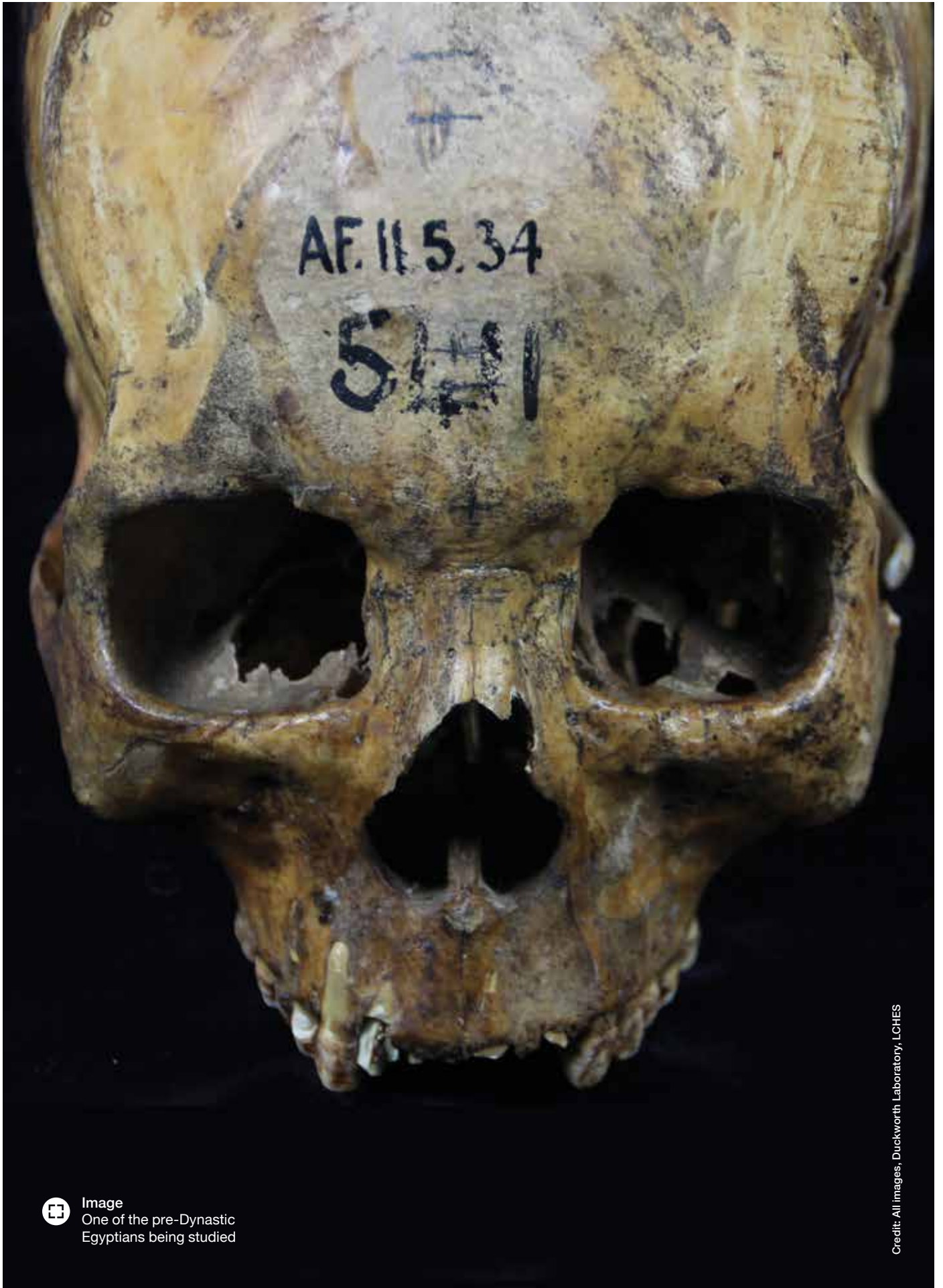


Image  
One of the pre-Dynastic  
Egyptians being studied

**Image**

A group of Sri Lankan refugees arrives in Tamil Nadu after a risky 30-mile boat ride across the Palk Straits

# Unsafe havens? Health risks for refugees

**A** new study is looking at a century of mass migrations worldwide to understand the public health consequences when people are forced to flee from war, persecution and natural disaster.

As the humanitarian crisis in Syria continues to unfold, over two million people are thought to have crossed the borders into neighbouring countries. Desperate, empty-handed and facing an uncertain future, most of the refugees will seek aid and support in camps, where they will be exposed to yet another threat: infectious disease.

High population densities, malnutrition, poor sanitation, sexual violence and reduced access to healthcare following forced migration can create a 'perfect storm' where communicable diseases become a major cause of mortality and morbidity. And it's far from a recent problem.

Over 600,000 cases of cholera have been recorded in Haiti since the earthquake of 2010, which displaced up to 2.3 million people. Cholera was also responsible for some 50,000 deaths in 1994 among refugees of the Rwandan genocide.

In 1949, the British Red Cross noted that malaria and dysentery were widespread among 30,000 Arab refugees living in huts, caves or ragged tents in Jordan. In 1901, Boer War refugees were exposed to measles, pneumonia, dysentery, diarrhoea, bronchitis and enteric fever in the camps of the Transvaal.

"Since biblical times, mass migrations have followed conflict and crises," said Professor Andy Cliff. "Today, humanitarian aid organisations perform an incredible job in taking care of refugees but this can take time to come into play, and the conditions that migrants find themselves in raises the spectre of epidemics. Diseases such as cholera, dysentery, measles and meningitis, for instance, have resulted in high mortality rates in relief camps in Africa, Asia and Central America."

Although the impact of forced migration on health is well known, no study has ever systematically linked the nature of displacement, its geographical location and the particular patterns of disease that occur: a triangulation that, if charted, could help authorities and aid agencies prepare as crises unfold.

## “Since biblical times, mass migrations have followed conflict and crises”

We call this the displacement–disease nexus,” added Cliff. “Understanding it lies at the heart of preparing for future displacements, both for the welfare of the migrants and for the health and economy of the destination.”

For the past year, Cliff from the Department of Geography and Professor Matthew Smallman-Raynor from the University of Nottingham have been leading a project that is assembling the first ever database to link these types of information. And to do so, their team is looking back over 100 years of forced migrations, across the globe.

“The research could scarcely be more timely,” said Smallman-Raynor. “The most recent figures released by the Office of the United Nations High Commissioner for Refugees (UNHCR) estimate up to 45.2 million people in situations of displacement for 2012, which is the highest figure in 20 years.”

Cliff’s colleagues Dr Anna Barford and Heather Hooper have begun the task of hunting through the rich archives held by organisations such as the UNHCR, the International Committee of the Red Cross, the United Nations Office at Geneva and the World Health Organization, as well as searching through scientific journals dating back to 1901. A doctoral student, Anna-Meagan Fairley at the University of Nottingham, is looking specifically at infectious disease among people displaced by natural disasters.

“Because each set of circumstances is unique, we need to look at as many cases of displacement as possible, over a long time period,” said Barford. “Only then can we start to work out whether there are patterns that governments and aid agencies can learn from in preventing epidemics and delivering healthcare.”

Epidemics of communicable diseases not only affect the health of migrants in camps, but also the health of those in areas the migrants pass through during their migration. “Perhaps one of the most significant examples relates to the First World War,” said Cliff. “Chaos ensued in terms of preparedness for the end of the war – several million refugees were swilling around on borders between Russia and eastern Europe, and you could map the spread of typhus and cholera marching with the refugees as they crisscrossed Europe.”

The results will be used to establish global electronic databases of infectious disease events in relation to mass population movements since the beginning of the 20th century. “It will be a fascinating resource,” said Barford. “Out of this we’ll pick 50 events and look in detail at the short-, medium- and long-term geographical patterns and consequences of displacement-associated epidemics. The databases will be available to national and international organisations involved in health promotion and in the delivery of humanitarian assistance.”

The results will also be published by Oxford University Press as one of a series of atlases; a previous volume in the series *Atlas of Epidemic Britain: A Twentieth Century Picture* authored by Cliff and Smallman-Raynor won the British Medical Association prize for Best Medical Book of the Year 2013.

The results of this ambitious project, which is funded by the Leverhulme Trust, will also be of interest to countries such as the UK that eventually become home to refugees after they have left intermediary camps. “This so-called secondary migration has been the cause of much public and political debate, with the UK’s Department of Health launching a consultation into proposals for charging migrants to use the health system,” added Cliff. “By also looking at the long-term health consequences for secondary migrants, we hope to shed light on how best to prepare for their arrival and support their healthcare.”



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### Migration and mental health

Infectious disease is not the only health threat that victims of forced migration face. Their mental health is also at risk.

Forced migrations are often the result of violent events or economic hardship, which can have profound psychological consequences. Migrants may be without their family support network and living in difficult conditions, while their left-behind families might find it equally hard to cope.

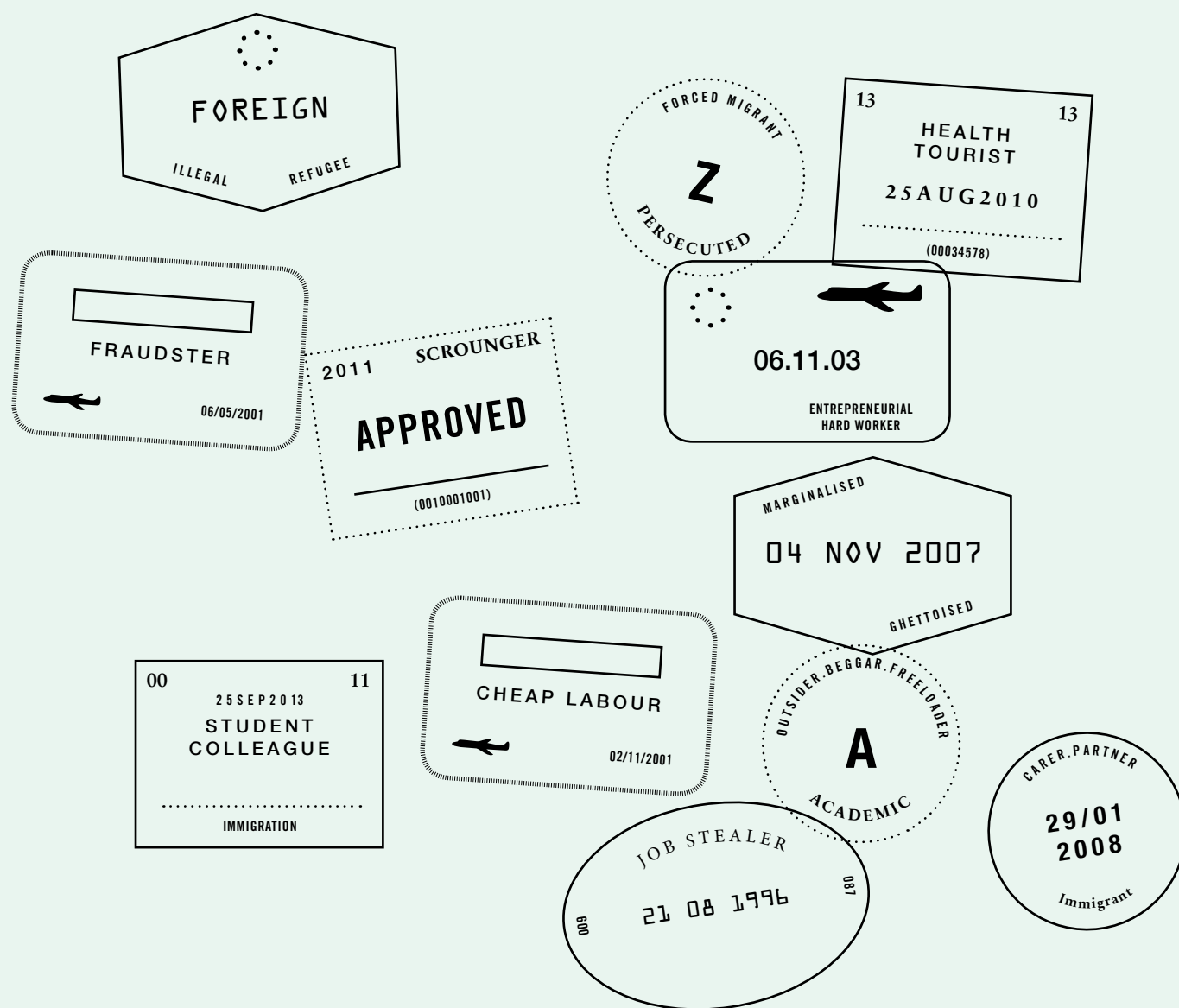
The mental health of individuals after forced migration, as well as after their subsequent return migration, is an area that Dr Tine Van Bortel from the University’s Institute of Public Health describes as “one of the least explored areas of health research.”

She has been involved in pilot projects that have looked at the quality of life, well-being and mental health of migrant domestic workers and their left-behind families in Singapore and Sri Lanka, and of Muslims forcibly resettled in 1990 by rebel fighters in Sri Lanka, working in collaboration with Dr Chesmal Siriwardhana and Sabrina Anjara at King’s College London and researchers at the Sri Lankan Institute of Research and Development (IRD).

“In terms of economic forced migration, we find that both labour-receiving countries and labour-sending countries have inadequate measures to provide the information, care and support that’s needed for migrant workers and their left-behind families,” said Van Bortel. “Some labour-receiving countries have health checks in place but these focus mainly on communicable diseases and not on mental health. Hard work, social isolation, abuse and missing their left-behind family members often lead to significant mental strain and sometimes suicide. In turn, the left-behind families often find it difficult to cope too.”

“We are now broadening our research to look at possible interventions to raise awareness, psycho-educate and empower people to make more informed decisions about economic migration, to help migrant workers and their left-behind families cope more constructively with often challenging situations, and to address the psycho-social needs of displaced populations,” added Van Bortel.

“Humanitarian agencies are increasingly aware of the psychological consequences of forced migration and have been campaigning for change. We hope that the results might be used by legislators and policy makers in countries affected by forced migration and internal displacement to improve policy and practice for the benefit of individuals, families and communities.”



# Citizens of the flow

**N**ew research from the Department of Sociology is looking at how rhetoric and policy shape immigrant identities, attitudes and behaviour in Europe.

In this age of globalisation, the country of your birth is not, for many, the country of your home. According to recent figures from the statistical office of the European Union (EU), 80% of the population increase in member states in 2012 was from migration.

Millions of people are pulled into this “flow of humanity” each year, crossing international borders in search of work and security, pulsing to the capitalist heartbeat of our global economy.

For many of the wealthier EU nations, immigration has been starkly defined as a ‘problem’, explained sociologist Dr Thomas Miley. “Relations between native citizens and migrant communities have become increasingly strained as anti-migrant rhetoric tightens its stranglehold on public perception – in the UK, EU and across the world.”

But there is little research into how migrants themselves are reacting to the politicisation of immigration: how does it feel to be treated like a curse on the land you are trying to call home, a citizen of the ‘flow’ and sometimes little else?

“Migrants are seen as having behaviours and attitudes that are completely determined by the countries they come from, but actually they’re here and part of the population, even if they’re not part of the citizenry. We’re interested in how these policies affect the outsiders – outsiders who are inside,” said Miley.

His research is focusing on the extent to which restrictive migration policies impact and ghettoise migrant communities, and how that reverberates back into ‘host’ societies, something Miley became interested in during his formative years in California in the era of Governor Pete Wilson.

Entering office in 1991, Wilson “rode on a wave of public resentment towards migrant Mexican communities during grim economic times for the state,” explained Miley. Wilson

was associated with Proposition 187, under which any suspected illegal immigrant had to prove legal residency in order to access basic services such as schools and medical care. “Considered by many civil liberty groups to be among the most toxic migration legislature enacted in modern America, Prop 187 shares eerie similarities to recent UK coalition policies towards new EU migrants.

“Places like California, as well as Spain – where we are currently conducting research – welcome migrants when boom times require labour; workers from poorer countries are grateful for better conditions



and their precarious situation means they are less likely to mobilise politically. It's like having an indentured servant,” said Miley.

“Then, in times of economic crisis and high unemployment, people start pointing fingers. Migration becomes politicised because – in terms of the democratic idea of getting votes – it's a winner. But it's not democratic politics; democracy assumes citizenship. Migration is a card that's easy to play politically because you are targeting people who don't have the rights of citizens.”

Spain is the country he knows best, and where the pilot study is taking place. When Miley arrived in Spain as a research fellow in the late 1990s, there was very little external immigration – less than 2% of Spain's population were born outside of the country. By the mid-2000s, that had risen to over 12%.

“For all the bluster, not enough is understood about the attitudes of people who now prop up key institutions across the continent”

“In the first few years of the Euro, you had a huge economic boom in Spain, and the conservative government welcomed immigrants from Latin America, tapping into imperial legacies to encourage migrant workers who might integrate better in terms of language, religion and even a shared conservatism.”

Men were required for the construction sector; women for domestic work – such as caring for the elderly. Public opinion polls of the time showed low levels of xenophobia, economic times were good and migration wasn't an issue for Spaniards. Then the global finance system crashed.

“With the outbreak of the crisis, unemployment has gone through the roof, crushing a whole generation of young Spaniards along with the migrants – the construction sector came to a standstill,” said Miley.

“But conditions are still better in Spain than in many of the countries the migrants came from. They have built lives there, so they're not leaving – in fact it is the young Spanish that are beginning to migrate.”

As Miley witnessed in California, familiar rhetoric and policies began to creep into Spanish national debate. It became harder for migrants to access healthcare and social security; different communities were offset against each other, given a pecking order in the national consciousness, with Moroccans fairs badly.

But in a country where fascism is still a relatively recent memory, right-wing populism is harder to mobilise without losing the centre ground. “While national politics moved to the right, it had to tread carefully. But at a local level, the right-wing populist game really came into its own,” said Miley.

The pilot study has focused on the Barcelona metropolitan area, with fieldwork interviews taking place among three of Spain's largest migrant communities – Latin American, Moroccan and Romanian – in two industrial cities called Badalona and Hospitalet. Here, Miley and co-researcher Enric Martínez-Herrera from the Universitat Pompeu Fabra in Barcelona have been asking migrants about their everyday experiences of everything from public transport to mass media, and gathering reactions to specific political discourse.

Tensions are particularly strained in Badalona, explained Miley. Xavier Albiol was elected mayor in 2011 on a strong anti-migrant line, and is currently on trial accused of discrimination charges, following a campaign pamphlet which featured images of anti-Romanian slogans.

“This is muddled further by conflict between old and new migrant communities, including internal migrants such as working-class Spaniards from the south of the country,” said Miley. “A myriad of attitudes get fused into a general anti-migrant sentiment that has nothing to do with conflict at the local level – where different marginalised groups are pitted against one another.”

He gives the example of Spanish gypsies in Badalona – a historically persecuted

“A myriad of attitudes get fused into a general anti-migrant sentiment”

minority – whose community leaders have formed an alliance with the far-right mayor, initially against new migrant groups of Romanian gypsies, and then migration generally. “This from an ethnic group synonymous with migratory living,” said Miley.

Once the Spanish study is finished, Miley and colleagues aim to replicate it in other European capital cities in a major piece of international comparative research, involving doctoral students holding focus groups with immigrants in countries such as France, Germany, Italy, Sweden and the UK.

“We want to find out how local and national political dynamics affect migrants, how their experiences shape attitudes towards the society they live in, and, importantly, to what extent they follow and understand the policies that will impact their lives,” said Miley.

The project aims to improve public debate in European democracies, he added, by cutting through media hysteria and knee-jerk politics to find out what it means to be a migrant in the 21st century. “We're distinguishing between politics and policies to look comparatively at how they impact the lives of migrants, and how that in turn affects interactions with domestic populations – the dialectical relationship at the cornerstone of what is known as ‘integration’.”

“For all the bluster, not enough is understood about the attitudes of people who now prop up key institutions across the continent. If migration stopped overnight, this University would be one of many institutions across the EU that couldn't function.”



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# FOREIGN POLICY

## *Home Truths*

**N**ewly published research investigates the contrasting approaches taken by European states to the multiculturalism that results from increased migration.

At the height of the search for Osama bin Laden in 2006, a US think-tank surveyed the relationship between westerners and Muslims living in Britain, Germany, France and Spain.

The results were eye-opening. Conducted by the Pew Research Centre in Washington, the poll found, for example, that 14% of British and 16% of Spanish Muslims had some “confidence” in the founder of al-Qaeda. About 15% in Britain and France could envisage a scenario in which suicide bombings might be justified. Meanwhile, at least 75% of British non-Muslims held that Islam was the “most violent” religion, even though 64% claimed to have at least a “somewhat favourable” view of the same.

Muslims are, of course, just part of the ethnocultural mosaic which constitutes large parts of Europe after decades of large-scale immigration. Since 9/11, they have also been the most prominent, and the subject of greatest apprehension. So the 2006 survey raised a couple of important points. First, it stressed that at least some elements within these minorities are not being successfully absorbed into supposedly multicultural European societies. Second, as the views on bin Laden indicated, there is a connection between those difficulties and the policies of European states abroad.

Yet the connection is often dismissed. Tony Blair, who was Prime Minister when four home-grown terrorists detonated bombs in London on 7 July, 2005, has for instance always denied that the atrocity was catalysed by wars in Afghanistan and Iraq. That is not a view shared by Eliza Manningham-Buller, Director General of MI5 at the time. At the Chilcot Inquiry in 2010, she spoke about a growing number of British citizens, “some of them third generation, who were attracted to the ideology of Osama bin Laden, and saw the West’s activities in Iraq and Afghanistan as threatening their fellow religionists.”

Blair’s view is also not one to which Christopher Hill, Professor of International

Relations at Cambridge, subscribes. In his latest book, *The National Interest In Question*, he addresses why, among European states, Britain has been the target of so many terrorist attacks, and points to the lethal mix of war in Muslim countries and a society in which many Muslims feel alienated. “Individually, neither of these factors would probably have been enough to have precipitated insurgency,” he writes, “together, they produced an explosive mixture.”

As a self-proclaimed ‘internationalist’ and noted expert on foreign policy, Hill came to the book with both personal and professional motives. For most of his life he has enjoyed living in the culturally diverse London Borough of Haringey. At various times, however, his home city has become “an epicentre of fear and tension”. This led him to reflect on the extent to which international and domestic affairs have become entangled.

“I’ve always been of the view that foreign policy is not just about the great game on a chessboard,” Hill said. “You can’t understand foreign policy without understanding certain domestic agendas. That’s increasingly true because of social diversity. Not everyone within a minority is happy to have their government represent them.”

The societies of the EU-15 states analysed in the book tend to be seen as ‘multicultural’, but that disguises extremely wide-ranging practices. Hill perceives three basic approaches: states like Britain, the Netherlands and Sweden celebrate diversity and the expression of group identities. Others, like France, Denmark and Greece, demand ‘integration’ with an existing national identity. In the third group, in countries such as Germany, Italy and Spain, a clear approach has yet to emerge. Here, immigrants live in ‘parallel societies’, partially acknowledged, often discriminated against.

The book suggests that no strategy has satisfactorily resolved the transformation that the sudden shock of 9/11 forced upon the relationship between events overseas and the home front, by alerting European states to the threat posed by minorities in their midst. Conversely, domestic matters suddenly became linked to the outside world: “No action, whether the banning of the hijab

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“Governments are sometimes not aware of the existence of alienation until it literally blows up in front of them”

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or a change in the abortion laws, now exists in a vacuum, unaffected by the international environment.”

Hill characterises such interconnectedness as “feedback loops” between a country’s take on its own ethnocultural diversity and its actions abroad. Discomfortingly, the book argues that the “loops” produced by countries such as Britain are perhaps not that effective. Often, he argues, enabling minorities to self-identify as distinctive creates a primary connection to external or transnational identities, such as the Muslim Ummah (the collective community of Islamic peoples). If Afghanistan and Iraq then become the object of British intervention, tensions boil over.

He argues that such linkages are only the most visible instances of multiple transnational ties that exist across and beyond European societies. The proliferation of minorities created by mass migration and more-open economies means that states now have to cope with diaspora politics, or simply the increased sensitivity of people to events beyond their borders.

This two-way flow between domestic and international events is difficult to manage or predict. No model is without its problems. France, with “the most assertively integrationist democracy in existence”, has marginalised its Maghrebian minorities to the extent that, in 2005, the youth of the banlieues rioted not about foreign policy, but limited opportunities at home.

Coupled with a more circumspect approach to foreign policy, France’s often bloody-minded restriction of expressions of identity and faith has resulted in surprisingly few home-grown terrorist incidents, but Hill suggests that the situation is unlikely to last. Increasingly, these non-integrated groups are turning to transnational organisations for support. Coupled with the dramatic changes in North Africa following the Arab spring, French foreign policy is unlikely to remain insulated from its Islamic minority. Meanwhile, the muddled lack of consensus in societies such as Germany and Italy is called into question the more their profiles rise on the international stage.

The potential to bind EU citizens through some sort of greater, pan-European identity



Credit: Stephane de Sakutin/AFP/Getty Images



#### Image

A policeman arrests people in the northern Paris suburb of Clichy-sous-Bois, 2005, after police clashed with angry youths

**As General Sir Richard Dannatt once wisely observed, if you are going to foster tolerance of minorities at home, you should think twice before you go round to their relatives' house to kick the door in**

remains, in Hill's view, a distant dream. While the European Council adopts broad stances on diversity (pro-social cohesion, pro-tolerance), it rarely displays the capacity to tackle specifics, such as citizenship, or group rights. Its own foreign policy, on matters such as asylum and terrorism, has been of limited success, not least because of the Member States' determination to retain sovereignty over diplomacy and immigration. Some avoidable tragedies, such as the deaths of immigrants trying to reach Lampedusa or Malta, have occurred because they slipped through the gaps between the gradations of the EU's much-vaunted "multi-level governance".

The abiding impression is one of nation-states, democracy and Europe in flux with each state precariously balancing responsibilities to its own society with those of contributing to civilised regional order. "Governments are sometimes not aware of the existence of alienation until it literally blows up in

front of them," Hill writes bluntly. Interventions overseas that begin with a specific goal, such as regime change, unpredictably increase the likelihood of "blowbacks" as they evolve into long-term processes like peacekeeping and nation-building.

What is undeniable is that migration in particular has forged a multitude of helical connections between the foreign policy of EU states and events within their own borders. Integrationism is one 'solution' but to some extent it denies changes on the ground. For its part, state multiculturalism has not "failed" as David Cameron would like to claim, but it has run into difficulties. Yet, multiculturalism does not in itself cause terrorism, nor breed radicals. Hill closes by suggesting that governments should extend their respect for differences within the state to influence policy making beyond it. As General Sir Richard Dannatt once wisely observed, if you are going to foster tolerance of minorities at home, you should

think twice before you go round to their relatives' house to kick the door in.

*The National Interest In Question: Foreign Policy in Multicultural Societies is published by Oxford University Press (2013).*



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# Soul seller: the man who moved people



Credit: Harper's Weekly (New York) November 7, 1874

**P**eople trafficking is a billion-dollar business with a history that spans centuries. A new study identifies the beginnings of the modern trafficker – the men and women who “sold souls” in 17th- and 18th-century Germany.

Johannes Tschudi was 23 years old when he and his wife Anna left Germany in 1749 aboard the *Crown* in search of work and a new life on American soil. He was to take the perilous voyage across the Atlantic a further four times – a remarkable number considering how many migrants, including his wife Anna, died on these trips. But perhaps even more remarkable is the fact that between his first and last voyage, Johannes Tschudi transformed from a trafficked migrant to

enter the business of selling souls – he became a human trafficker.

The notion of human trafficking is a familiar one today: individuals, either lured by the prospect of a better life or coerced, are recruited, transported, harboured and ultimately exploited by the trafficker. The United Nations Office on Drugs and Crime estimates that at any one time this billion-dollar business is responsible for 2.5 million victims, many of whom will end up in forced labour, slavery, prostitution or begging.

In the 17th and 18th centuries, trafficking was connected with a rather different purpose, as historian Dr William O'Reilly explained: “Trafficking speeded up the establishment of new settlements in America







## Image

German migrants boarding a steamer in Hamburg, Germany, to travel to America

and eastern Europe, where a labour force was needed. This was a time when people were resigned to the inevitability of emigration. Borders were relatively close and various wars had left individuals questioning their long-term safety. In the 18th century alone, as many as one million emigrated from their homelands in western and central Europe to start new lives, mostly in North America and Hungary.”

In fact, the German people, O’Reilly finds, were one of the most migratory of all national groups at this time. Yet the role of the traffickers to populate these new societies has been largely overlooked.

His research, to be published as a book in 2014, provides fresh insight into the activities of these people movers, arguing that their actions kick-started the first systemisation of migration: “Until the process of moving people became a profitable business enterprise, and connections were made between the supply and demand for human cargo, large-scale migration could not occur.”

On Tschudi’s first journey in 1749, he was one of 476 migrants all connected to him by blood or village; they had been recruited by Johannes Marti. On his final journey in 1767, Tschudi had recruited all 62 passengers on board the *Sally* bound for Philadelphia. “It seems likely that Marti was, at least in part, responsible for the recruitment of Tschudi as a migrant to the Americas and may have facilitated his re-invention as a recruiting agent himself,” said O’Reilly. “This was a chain migration, but it was also a chain recruitment, where the apprentice learnt from the master agent.”

In studies of migration, movement of people is often considered in terms of ‘push and pull’, in which labour shortages in one area might pull migrants, and poor conditions at home might push them. “But this model does not adequately explain European migration before the 19th century; it would suggest that all migrants acted freely and independently,” said O’Reilly.

“This was not the case here. It was more often directed by traffickers towards a specific territory because of the financial reward they would accrue and it was done so through their command of a niche market in information. By selling labour bonds – a *ceel* in Dutch – these traffickers sold on more than a person’s labour; they sold their soul, or *ziel*. Contemporaries considered that these labour-bond sellers became 18th-century soul sellers, the beginning of the modern trafficker.”

O’Reilly’s painstaking study of ships’ logs, maps, newspapers, arrest warrants, customs documents, river networks and letters, across seven countries, has enabled him to paint a remarkable picture of the complex processes that were at work. “Traffickers provided a bridge to a new life in a new land for those wishing to cross. It was a market where

labour was retailed most successfully if people like Tschudi acted as brokers, filling ships with ‘human freight’ for the transatlantic crossing.”

In effect, the traffickers were walking propaganda machines. “They had to convince would-be migrants of the benefits of migration, to the point of underhand deception. As one example, some were told ‘roasted pigeons would fly into their mouths without having to work for them!’”

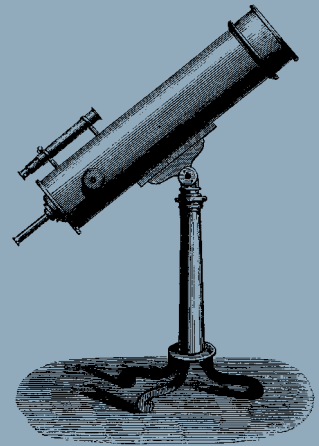
The traffickers also had to thwart negative stories about the harrowing journey fed back by previous migrants. One traveller wrote: “hunger, thirst, and scarcity of all help had cost the lives of the majority on the ship.” Another that many “came close to murdering one another” in the cramped conditions. There were even tales of having to cook and eat dead fellow passengers. O’Reilly estimates mortality at around 15% or even higher as shipping firms in Holland, England and America, seeking to maximise profits, continued to raise the average number of emigrants per vessel.

*“This was a chain migration, but it was also a chain recruitment, where the apprentice learnt from the master agent”*

“Tschudi, and others like him, learned quickly that by counteracting these negative descriptions of the journey with stories of limitless land and bread, of freedom and prosperity, he could turn a handsome profit,” said O’Reilly.

Traffickers could access information about opportunities abroad that was not generally known to potential emigrants. “For me, one definition of trafficking is the sourcing and supply of information leading to migration. In this regard, this is a story across time. From what I’ve found looking at contemporary situations – human trafficking from Moldova, for example – nothing has changed terribly much. The information comes from migrants who return home typically in the employ of other agents, and who then gain money for every migrant they recruit in turn.”

“It opened up information channels for those who, through illiteracy or geographic isolation, would have remained ignorant of the possibilities open to them,” he explained. “But the information was endowed with inflated images and delivered by those adept at marketing it for their audience.”



Tschudi’s dishonesty was publicly revealed. Shortly after the *Sally* docked in Philadelphia, a letter appeared in the local newspaper on behalf of all the migrants who had taken the journey, denouncing him as a “paragon of wickedness, an arrant liar and an out-an-out deceiver” who had “enticed and seduced nearly fifty people” to travel to America, in part through blackmail, in part through the threat of physical violence. “Their resentment was focused on the arduous journey,” said O’Reilly, “but no doubt by this stage the migrants would also have encountered the realities of settling in a new country and finding suitable employment, and have come to realise that not all was paved with riches as he had described.”

“Tschudi refused to accept the accusations levelled against him but his accusers would not go away,” added O’Reilly, who estimates that migrants would have paid £5–10 for the privilege of emigrating. “Denouncing him, they said that he had tricked them with his tales of encouragement, while all the while ‘he took a sum of money from a merchant... with the promise of delivering to him a number of people’.” Men, and women traffickers too, grew rich on the profit of human trafficking.

O’Reilly’s research highlights the role of traffickers like Tschudi as key to the process of migration. “Facilitator, escort, at times swindler and cheat, the human trafficker bound an ever-shrinking world together with ties of information and opportunity, and in effect aided the development of global labour markets for Europeans.”



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“Without paperwork  
I am nothing. I do not  
appear to exist”

**R**esearchers from the Institute of Criminology reveal that many women trafficked into the UK who commit crime under duress are imprisoned without support or protection, and call for improved ways to identify the victims among the offenders.

As the interview with the female prisoner came to a close, the researcher – through a translator – enquired whether she had any questions she would like to ask. The prisoner asked when she was going to be shot.

Trafficked into the UK and then detained for a crime, the prisoner had spent six months in a UK prison believing herself to be under a death sentence. No one had ensured she understood her situation.

Between 1999 and 2009, the number of foreign nationals in female prisons jumped from 8% to 19%; they had mainly come from countries like Nigeria and Vietnam, and were usually imprisoned as a result of crimes relating to theft, drugs or false



documentation. However, the distinction between 'victim' and 'offender' in many of these cases is blurred, says criminologist Professor Loraine Gelsthorpe: "many of those described as 'offenders' will have had little to no choice, and are often victims of crime and horrifying abuse themselves. Some have been held captive in slavery-like conditions, forced to work as prostitutes or in drug factories – sometimes for years. Some have been raped and beaten, and their documents withheld by criminal gangs."

"Offenders are assumed to have agency; whereas victims don't have agency – but those who are trafficked very often have both," explained Gelsthorpe. "There is a confusion of narratives which the criminal justice system doesn't know how to respond to."

Although the UK has a National Referral Mechanism (NRM) for the identification and support of 'victims' of trafficking, which was introduced in 2009, Gelsthorpe believes there are major issues around its effectiveness: "there are big questions as to whether the training of first responders – such as police and border agencies, but also third sector organisations – is currently sensitive enough to enable victim identification," she said.

The new Human Slavery Bill, announced by the Home Secretary at the end of 2013 has pledged to review the NRM process and establish a 'legal duty' for first responders to report all suspected cases of human trafficking to the NRM.

To address the 'knowledge gap' that undermines the position of foreign national women who end up in UK custody, Gelsthorpe and Dr Liz Hales from Cambridge's Institute of Criminology spent 18 months conducting in-depth interviews with 103 migrant women across several prison establishments and Yarl's Wood Immigration Removal Centre.

Of those interviewed, 43 were found to be victims of trafficking, although only 11 had been processed through the NRM (and, for two of the women, this didn't happen until after their sentences had been served).

A further 15 women had either entered the UK independently but then worked in slavery-like conditions, or had their documents stolen by those who smuggled them in – a situation that resulted in the crime for which they had been convicted.

The research, funded by the Economic and Social Research Council, culminated in a major report by Gelsthorpe and Hales – *The Criminalisation of Migrant Women*. It makes for harrowing reading. Research findings are interspersed with testimony from many of the interviewees, giving accounts of the exploitation and abuse they suffered before entering custody.

The women had set out for the UK in the hope of better lives, many believing they had already secured legal work. Among them were women who had been abused, starved and forced into sex work. Routine rape and forced abortion left some with severe internal injuries. Many underwent servitude and imprisonment. Some were victims of war crimes in their homeland, and had witnessed

executions of husbands and children.

Once arrested as offenders in the UK, those interviewed spoke of confusion, terror and powerlessness when confronted by the authorities.

Interpreter support and access to documents in languages the women could understand were frequently lacking or limited. Some women spoke of trying to tell the police what had happened, but without being understood or in some cases dissuaded from doing so by their ascribed legal counsel.

During police questioning, fear of traffickers and cartels often prevented full disclosures. One woman explained to police she had been held captive for seven years and forced to work as a prostitute, yet was told her story did not make "a great deal of sense" as she sounded too "sensible". Another victim of trafficking told police she had been forced to work in a cannabis house but didn't know the names of those involved: "because of that I do not think they believed me." She was sentenced to two years.

None of these women knew what the term 'trafficking' meant.

"An incoherent story, one that makes police suspicious, might be a result of the trauma the person has experienced," said Gelsthorpe. "Many NRM assessments are made alongside decisions on asylum, mainly by the immigration department, and the frame of mind is often one of suspicion – the very term 'asylum seeker' has been criminalised. There needs to be caution in assessments, but caution is different from suspicion."

Gelsthorpe describes being amazed that, in some cases, obvious signs of abuse – such as physical scarring – went unrecognised in prisons.

Interviewees spoke of complete disorientation during court proceedings. The process focuses on the offence, and seems to exclude the context in which it took place, write the researchers. One woman described her helplessness in the UK court as "like being in the hands of the people who brought me here."

Another trafficking victim, arrested for use of a false document, summoned the courage to tell her legal representative all she had suffered. "I am not going to mention to the court that you have worked in sex work as this will not be in your favour," was the only response.

Many migrant women find themselves trying to survive in a foreign prison without much idea as to how long they will serve and what will happen next, some without knowledge of, or access to, their children for months at a time.

Gelsthorpe and colleagues presented their report to MPs and Peers in the House of Lords in 2013, outlining several policy implications. They recommend training for government agencies based on key 'indicators' – such as types of offences – for flagging up trafficked women; interviews should then be carried out by female staff with interpreting support, to investigate human rights abuses.

"Some relatively simple changes would

## “ ‘Offenders’ will have had little to no choice, and are often victims of crime and horrifying abuse themselves ”

make a big difference in these cases," says Gelsthorpe. "These include induction videos for all remand prisoners with subtitles in key languages, explaining the functions and stages of the court system as well as legal terminology, and standard questions on the need for interpretive support before police interviews and court appearances." She also suggests that prison healthcare staff be trained as active first responders.

As well as aiming to expand the study into mainland Europe by looking at anti-trafficking measures, Gelsthorpe is in discussion with various police forces about taking the research further, and has had follow-up meetings with government policy makers.

"I know that the police worry about identifying those committing crime under duress, and want to refine their responses," she said. "We want to keep people on board. It's not a question of just presenting a report on the table – that's not the kind of research we do. If we want academic research to have impact, then we have to work with those who can create change."

"But the message is clear: the powerlessness of these women in the hands of their traffickers is terrifyingly replicated within the criminal justice system, the legitimacy of which stands or falls on the way it treats victims as well as offenders."

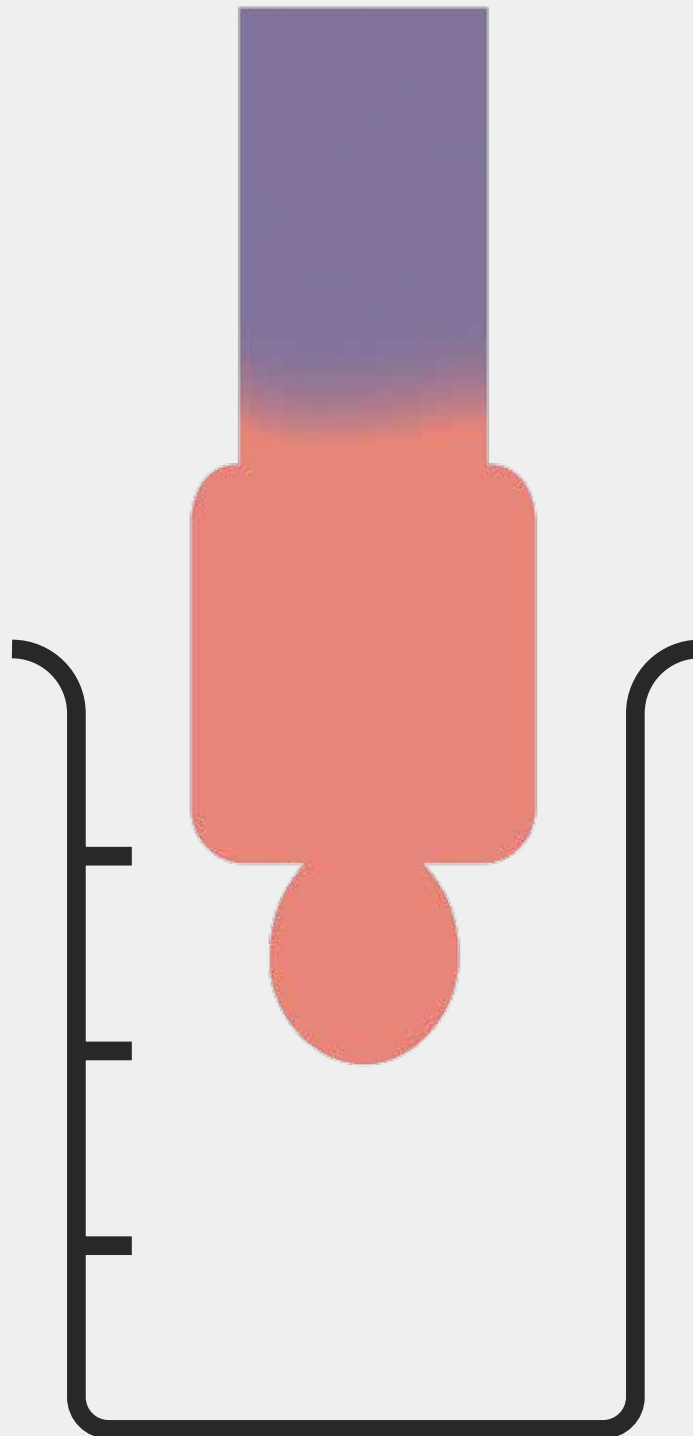
Read the full report at [www.crim.cam.ac.uk/people/academic\\_research/loraine\\_gelsthorpe](http://www.crim.cam.ac.uk/people/academic_research/loraine_gelsthorpe)

Professor Gelsthorpe and Professor Madeleine Arnot (p. 28) are Co-Convenors of a new Cambridge Migration Research Network.



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# Migrant children: the litmus test of our education system



**W**e live in a multilingual society. More than a million children attending British schools speak more than 360 languages between them in addition to English. An exploratory study is looking at the needs of these children and their schools within and beyond the classroom.

The dominance of English as a global language can mask the fact that many different languages are spoken in homes across the UK. The million-plus children attending British schools who have English as an additional language (EAL children) face particular challenges – as do the teachers supporting them to integrate into the school environment and reach their educational potential.

Much of the existing research into the performance of EAL pupils has focused on the acquisition of a good level of English language. But this is only one indicator – though certainly a vital one – of their engagement and educational performance. The ways in which EAL pupils are able to access and respond to key subject areas right across the curriculum, and to feel included in school life, are also significant factors in their development.

Now, a pioneering study, instigated and funded by the Bell Foundation, is taking a look at the relationships between linguistic development, academic performance and social integration of EAL children, across the curriculum and beyond the classroom.

Led by Professor Madeleine Arnot from the University's Faculty of Education and Dr Claudia Schneider from Anglia Ruskin University, the Bell Foundation Research Partnership includes Michael Evans, Yongcan Liu and Oakleigh Welply from the Faculty and Deb Davies-Tutt from Anglia Ruskin, bringing together expertise in second language education with sociological theories of migration. Both Arnot and Schneider have extensive experience of researching the issues that affect those children seen as outsiders and the schools they are placed in, and are experts in immigration theory, asylum policy and migration.

It's a timely project – in the UK, the number of EAL children almost doubled between 1997 and 2010 from 505,200 to 905,620, including Eastern European migrants and refugees. "Migrant children represent the litmus test of the values underlying an educational system within a democracy," Arnot said. "Their presence in a school highlights the degree to which compassion, caring and justice shape our education system."

Drawing its information from real-life school environments in the East of England, the study explores the contribution that schools make in addressing the linguistic and non-linguistic needs of EAL pupils, and uncovers the links between language development, achievement and social integration at classroom level.

The researchers carried out group and individual interviews with some 40 young people, their parents and teachers as well as EAL coordinators, experts and local authority advisors. This first part of the study, which has just been completed, exposes the problems of knowing 'what works' for such children,

how to communicate with non-English-speaking parents, how new arrivals should be assessed and supported, and whether speaking their own language in school helps or hinders.

Recent research by Dr Welply on the experience of immigrant children in France and England found that immigrant children in both countries experience school as monocultural and monolingual spaces, in which they can feel excluded but for different reasons. French primary school pupils felt excluded by the schools' approach to linguistic or cultural differences; one pupil commented that she was not allowed to speak Arabic or practise her religion... "apparently it can attract problems," she said. In England, it was peer-group relations that created such exclusion, despite the school's support for linguistic diversity.

Lack of 'belonging' was pinpointed as a significant issue for educating refugee children in previous work by Arnot, which culminated in the publication, with co-authors Halleli Pinson and Mano Candappa, of *Education, Asylum and the 'Non-Citizen' Child*. The book highlights the experiences of refugee children and their teachers in a context that all too often demonises strangers. As one Afghani pupil said: "Some English people, they just don't like us. If you argue with them they just tell you 'go back to your country, why are you in England?'"

The second part of the Bell Foundation Research Partnership study has just begun. Directed jointly by Evans and Schneider, it will focus on a longitudinal tracking of linguistic and academic skills and the progress of a sample of recently arrived pupils, looking at how achievement in these areas correlates with social integration.

The densely populated East of England has a high proportion of migrant workers from the European Union and neighbouring countries. Many play a vital role in sectors such as healthcare, hospitality and agriculture. Figures for 2013 from the Department for Education show that in Cambridgeshire schools some 10% of primary pupils were EAL pupils, with a lower proportion (7.6%) of secondary pupils falling into this category. Within the East of England region as a whole,

these figures were higher (12% and 8.9% respectively), reflecting the concentration of EAL pupils at schools in and around Peterborough.

"Children of these incomers enter local schools with the desire to fit in and make the most of their educational opportunities," explained Evans. "Schools, however, often have little information about the education these new pupils have received in their home countries and the children themselves often choose not to disclose information about their previous schooling." Whether and how this kind of information should be gathered – and whether and how it might be shared between staff within a school – is just one example of the aspects of schools' management of EAL pupils that the current research is addressing.

To flourish, EAL students need to feel welcome and secure; an outwardly confident pupil may in reality be easily discouraged by differences in teaching methods. EAL pupils may come to the maths curriculum, for example, having learnt a particular method of calculating percentages and, on entering a different school, are confronted with an unfamiliar way of working.

Many schools report that diversity in pupils significantly enriches the school environment: children of migrant families tend to be highly motivated to learn and make huge efforts to join in. Although these schools emphasise that they need additional resources to fulfil their roles in providing access to the curriculum for children whose first language is not English, their experiences of migrant children contradict the stereotyping by a sector of the media that portrays migrants as a drain on resources.

Research shows that schools can play a vital role in uniting communities and fostering understanding between different groups. "If migrant children have access to a good education in this country, even if their stay here is temporary, they will carry the experience with them wherever they live in the future," added Arnot. "That can only be a good thing for all of us."

*Education, Asylum and the 'Non-Citizen' Child: The Politics of Comparison and Belonging* is published by Palgrave Macmillan (2010).

Professor Arnot and Professor Loraine Gelsthorpe (p. 26) are Co-Convenors of a new Cambridge Migration Research Network.

Immigrant children experience school as monocultural and monolingual spaces, in which they can feel excluded



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**D** London Hospital

22<sup>nd</sup> Nov 1831

R. Jackson



## Cities of dreams... and death

Credit: Watercolour by Robert Carswell in 1831,  
with permission of the Wellcome Library, London



**Image**  
Smallpox was a major cause  
of death in cities of 17th- and  
18th-century England.

**T**he fate of migrants moving to cities in 17th- and 18th-century England demonstrates how a single pathogen could dramatically alter the risks associated with migration and migratory patterns today.

Cities have always been a magnet to migrants. In 2010, a tipping point was reached for the first time when, according to the World Health Organization, the majority of the world's population lived in cities. By 2050, seven out of 10 people will have been born in – or migrated to – a city. One hundred years ago, that figure was two out of 10.

Today, cities are generally the safest places to live. If you live in one, you're likely to be richer than someone living in a rural environment. If you're richer, you're likely to live longer. If you live in a city, you have better access to hospitals and healthcare, and you're more likely to be immunised.

But that was not always the case. In 17th- and 18th-century England, city life was lethal – disproportionately so for those migrating from the countryside.

Dr Romola Davenport is studying the effects of migration on the health of those living in London and Manchester from 1750 to 1850, with a particular focus on the lethality of smallpox – the single most deadly disease in 18th-century England.

In the century before 1750, England's population had failed to grow. Cities and towns sucked in tens of thousands of migratory men, women and children – then killed them. It's estimated that half of the natural growth of the English population was consumed by London deaths during this period. Burials often outstripped baptisms.

In 2013, cities are no longer the death traps they once were, even accounting for the millions of migrants who live in poor, often slum-like conditions. But will cities always be better places to live? What could eliminate the 'urban advantage' and what might the future of our cities look like if antibiotics stop working?

By looking at the past – and trying to make sense of the sudden, vast improvement in survival rates after 1750 – Davenport and the University of Newcastle's Professor Jeremy Boulton hope to understand more about city life and mortality.

"For modern migrants to urban areas there is no necessary trade-off of health for wealth," said Davenport. "Historically, however, migrants often took substantial risks in moving from rural to urban areas because cities were characterised by substantially higher death rates than rural areas, and wealth appears to have conferred little survival advantage."

The intensity of the infectious disease environment overwhelmed any advantages of the wealthy – such as better housing, food and heating. Although cities and towns offered unparalleled economic opportunities for migrants, wealth could not compensate for the higher health risks exacted by urban living.

"Urban populations are large and dense, which facilitates the transmission of infectious diseases from person to person or via animals or sewage. Towns functioned as trading posts not only for ideas and goods but also for pathogens. Therefore, growing an urban population relied upon substantial immigration from rural areas," explained Davenport.

"After 1750, cities no longer functioned as 'demographic sinks' because there was a rapid improvement in urban mortality rates in Britain. By the mid-19th century, even the most notorious industrial cities such as Liverpool and Manchester were capable of a natural increase, with the number of births exceeding deaths."

Davenport has been studying the processes of urban mortality improvement and changing migrant risks using extremely rich source material from the large London parish of St Martin-in-the-Fields. The research, funded by the Wellcome Trust and the Economic and Social Research Council, is now being augmented with abundant demographic archives from Manchester, funded by the Leverhulme Trust.

For both cities, Davenport and colleagues have access to detailed records of the individual burials underlying the Bills of Mortality, which were the main source of urban mortality statistics from the 17th to the 18th century. These give age at death, cause of death, street address and the fee paid for burial, which enables them to study the age and sex distribution of deaths by disease. In addition, baptismal data allow them to 'reconstitute' families as well as to measure the mortality rates of infants by social status.

"The records themselves give only a bald account of death," said Davenport. "But sometimes we can link them to workhouse records and personal accounts, especially among the migrant poor, which really bring home the realities of life and death in early modern London."

"Smallpox was deadly. At its height, it accounted for 10% of all burials in London and an astonishing 20% in Manchester. Children were worst affected, but 20% of London's smallpox victims were adults – likely to be migrants who had never been exposed to, and survived, the disease in childhood. However in Manchester – a town that grew from 20,000 to 250,000 in a century – 95% of smallpox burials were children in the mid-18th century, implying a high level of endemicity not only in Manchester but also in the rural areas that supplied migrants to the city."

"So studying urban populations can tell us not only about conditions in cities but also about the circulation of diseases in the rest of the population."

The greater lethality of smallpox in Manchester is, for the moment, still a mystery to researchers; but evidence suggests the potential importance of transmission via clothing or other means – as opposed to the person-to-person transmission assumed in mathematical models of smallpox transmission in bioterrorism scenarios. Although smallpox

**"Urban populations are large and dense, which facilitates the transmission of infectious diseases from person to person"**

was eradicated in the late 1970s, both the USA and Russia have stockpiles of the virus – which has led to fears of their use by terrorists should the virus ever fall into the wrong hands. Data on smallpox epidemics before the introduction of vaccination in the late 1790s are very valuable to bioterrorism researchers because they provide insights into how the virus might spread in an unvaccinated population (only a small proportion of the world's population is vaccinated against smallpox).

From 1770 onwards, there was a rapid decline in adult smallpox victims in both London and Manchester, which Davenport believes could be attributable to a rapid upsurge in the use of smallpox inoculation (a precursor of vaccination) by would-be migrants or a change in the transmissibility and potency of the disease. By the mid-19th century, towns and cities appear to have been relatively healthy destinations for young adult migrants, although still deadly for children.

"Smallpox was probably the major cause of the peculiar lethality of even small urban settlements in the 17th and 18th centuries," said Davenport, "and this highlights how a single pathogen, like plague or HIV, can dramatically alter the risks associated with migration and migratory patterns."

"The close relationship between wealth and health that explains much of the current 'urban advantage' is not a constant but emerged in England in the 19th century," added Davenport. "While wealth can now buy better access to medical treatment, as well as better food and housing, it remains an open question as to whether this relationship will persist indefinitely in the face of emerging threats such as microbial drug resistance."



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# Home

## from Home

### *Minor moves make major differences*



**M**ost of the moves we make are within 5 km of our previous addresses, yet these short migrations are highly significant within individual lives. New research is looking at the links between residential mobility, life events and exchanges of social support within families.

It was no coincidence that house price rises, increased housing transactions and a surge in employment within the property industry were seen as signs of an upturn in the economy late last summer. One in four new jobs created in the previous 12 months, it emerged from data produced by the Office for National Statistics, were in the housing sector. Our homes are more than our castles: they are, in many ways, the lifeblood of the economy.

Behind the jibes branding Britain as a nation of estate agents is a highly significant fact. On average, more than half of the moves we make in our lifetimes are within roughly 5 km of our previous addresses. The term migration conjures up an image of large distances – crossing national boundaries or even continents – but the moves we undertake most frequently are much more local and are often motivated by the desire to make what might be seen as relatively minor adjustments to how we live.

At first glance there is nothing remarkable about moving just a few streets or to accommodation with three bedrooms rather than two – or to downsize from a house to an apartment. But the importance of this internal mobility should not, however,

be underestimated, either in terms of what these moves mean to the people involved or how they contribute to the bigger picture of local and regional economies.

These aspects of internal migration – and others – are of great interest to Professor Jacqueline Scott and Dr Rory Coulter from the Department of Sociology. Together they are collaborating on research that explores the links between residential mobility (or immobility), life events and household changes, and exchanges of social support within families.

In the early 1990s Scott was responsible for the initial design and implementation of the British Household Panel Survey (BHPS) – a hugely important resource for the study of changing family and household structures that was begun while she was at the University of Essex. Her research interests include inter-generational relations and shifting gender roles. Coulter, whose PhD focused on the links between moving desires and subsequent moving behaviour, describes his key interest as “the interactions between people and places – how people shape places, and conversely how places shape people”.





Their research into internal migration aims to get to the heart of why we move, when we move, and what those moves mean in terms of the small but vitally important details of our lives. Where we live, and how close (or distant) we are to the people and places most significant in our day-to-day lives, play a huge part in our well-being. A move closer to the station, to the catchment area of a particular school or to a preferred neighbourhood, for instance, may have important personal implications for opportunities for work, education and friendships. When taken with the moves made by others, this has wider implications for the provision of transport, schools and other businesses, services and facilities.

*The term migration conjures up an image of large distances... but the moves we undertake most frequently are much more local*

Data extrapolated from BHPS (1991–2008) and its successor survey, Understanding Society, which is run from the University of Essex's Institute for Social and Economic Research and funded primarily by the Economic and Social Research Council, can give us the much-needed human angle on internal migration. We know, for example, that moves peak early in young adulthood (18–30), and that the frequency of moving declines rapidly after age 35. We know too that changing family trajectories impact on household size and thus on housing demand. But much more remains to be discovered about the finer details of decision-making surrounding internal migration.

As Coulter explained: "Data from panel surveys like BHPS are an incredibly rich resource for studying residential mobility. For example, using BHPS we are able to model exactly when people move home. We can estimate how having a baby affects how likely a couple are to move, as well as the type of dwelling and neighbourhood they choose to move to.

"By enabling us to model the timing of job changes and residential moves, BHPS data also allow us to study how people use residential mobility to co-ordinate their work and family life. In addition, because many panel surveys like BHPS interview every member of selected households, we are able to get multiple people's perspectives on each relocation event. This allows us to explore which partner's preferences have the strongest effects on a couple's moving behaviour, as well as how moves affect the

social networks of adults and their children". Scott is particularly interested in the relationship between residential mobility – or immobility – and family support networks. This includes looking at how gender affects household moving decisions and who benefits and gains most when a household makes (or does not make) a residential move.

The past 30 years or so have seen families disperse across greater distances as a result of employment change (for example, the decline of traditional industries and the growth of service sector employment) and the expansion of higher education. However, falling levels of state support combined with the demands of an aging population and political aspirations to increase female employment mean that support from family remains a vital aspect of well-being for many people.

"Given that informal networks for supplying and receiving many forms of support (such as childcare from family members) require people to live nearby to each other, it's surprising that relatively little is known about how support exchanges may influence and be configured by residential mobility behaviour in conjunction with changes in family structures," said Scott.

One example might be the decisions that underlie elderly people moving to be closer to their children or, conversely, children moving to be closer to their elderly parents. Another might be to investigate how residential moves are prompted by other life events such as childbirth or union dissolution (divorce or relationship break-up).

"We hope that our work will throw light on the question of how residential mobility is linked to family transitions and the changing supply and receipt of social support over the course of people's lives. The answer to this complex question is likely to be correspondingly complex. To tackle it we will draw on the rich longitudinal data collected by surveys such as BHPS over the last two decades," said Scott.

"By providing evidence about the links between residential mobility and exchanges of social support within social and kin networks, we anticipate that our work could inform the planning and policy development decisions of a range of government bodies and non-governmental organisations."



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## Extreme sleepover: The wet-nursing meerkats of the Kalahari

In her report from the Kalahari Desert, PhD student Kirsty MacLeod describes the fascinating life of a gang that includes an audacious boy called Bruce and a good-natured girl called Ru.

I never thought I would be quizzing people over a radio about the sandiness of nipples. Then again, I never foresaw that for many months my days would start with a bump, lurching over sand dunes in a Land Rover, heading off to find meerkats, to whom those nipples belong. Life in the Kalahari is inherently full of surprises.

My PhD research with Professor Tim Clutton-Brock has brought me here, to the far northern reaches of South Africa, where I study the phenomenon of allolactation – essentially, wet-nursing. In each of the 16 groups of meerkats scattered across our large reserve, only one dominant female will breed. The other females in the group will help her to raise her young, sometimes even lactating for



them. This year though, those females are not being forthcoming, and their nipples, which will have wet, sandy rings around them if they are allolactating, remain dismally dry.

The radio crackles as the network of volunteers spread out in separate cars and on foot to begin the task of monitoring different meerkat groups. I'm dropped off, and suddenly am in a state of solitude that I've come to find blissful. At the top of Sandy Hill, a large dune and one of our main landmarks, I leave grey flat scrub behind me and come to my favourite part of the reserve. Here the grass is a dry platinum, and dunes tumble gently into wide valleys. Tall trees, now erupting into a lush green after the first rains, are dotted evenly like a wild orchard. I love best the southward vista, where the dunes drop so suddenly to the flats that it looks like the edge of the world.

It is the edge of the world for my favourite group of meerkats, the Sequoia group. I find their burrow just in time – the first to rise, just as the sun is coming up, is Bruce. He's the dominant male of the group, a well-built and handsome meerkat easily recognisable from his striking left shoulder and left thigh dye marks, our means of identifying each individual. Bruce is a local hero for his audaciously bold guarding of his group – he can often be seen high up in some tree, watching the horizon with a fierce expression. The dominant female, Ru, is a big, good-natured girl, and her cohort are characterful and a pleasure to wander in the dunes with.

After weighing each individual and conducting a roll-call, I follow the females I'm interested in – the dominant female and the potential allolactators – and collect detailed data on their every move, as well as staying aware of what's going on with the whole group. Summer in the Kalahari is a time to watch your step too. I walked past the same bush dozens of times in Sequoia territory last week before we heard the telltale deflating-football sound of a deadly poisonous puff adder coiled menacingly at its base. It raised a lazy head at a young male venturing too close, who thankfully alerted the group, and me, to its presence.

Watching my step is also important for happier reasons – to avoid the plucky little pups who dart around the adult females that I'm following in the hope of getting fed a juicy grub.



**Only one dominant female will breed. The other females in the group will help her to raise her young**

The pups at Sequoia are obsessed with shoes, and play-forage around my heels as I record observations on their mother. If I sit down, there's soon an investigation of my hems, laces and pockets. The pups are still the size of my palm, though getting heavier by the day.

There is a time somewhere between 11 o'clock and midday when the Kalahari turns from a balmy, soft-edged paradise to a hell that crackles underfoot and becomes alien and angry, with a sudden fierce heat. Time to head home, and sleep off our early morning.

I'm back out again mid-afternoon though, this time looking for Pandora, a group at the far edge of the land we cover. I find them using signals from a tiny radio collar that the pregnant dominant female, Toblerone, wears around her neck. But something odd is going on this evening – and I find I'm getting a strong signal for Toblerone below ground, at the group's burrow. Luckily most of the rest of the gang, including a lovable adult male

She emerges,  
sleek and placid,  
with the suckle  
marks on her  
belly of some  
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healthy pups

called Cecil – an incorrigible lothario with neighbouring groups – are foraging fairly nearby.

It's cooling now, but it's been a long, hot afternoon, and when we return to the burrow at dusk, they are all eager to jump on my scales and be weighed, and then receive the gulps of water we reward them with. After a few moments, I discover the reason for



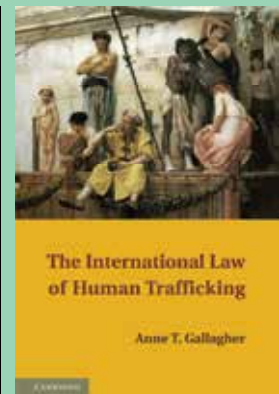
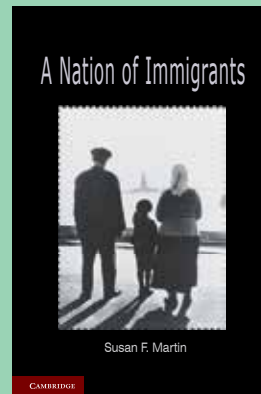
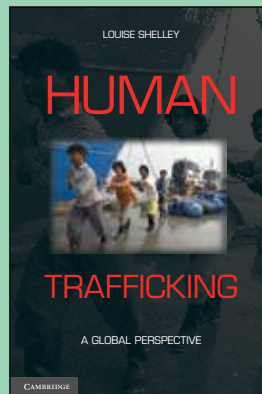
Toblerone's absence is just as I expected – she emerges, sleek and placid, with the suckle marks on her belly of some strong and healthy pups, born this afternoon. And even better news for me, the oldest subordinate female also appears, and by the sandy rings around her nipples, it looks like she has also started lactating – the first allolactator of my study. Like I said, the Kalahari is full of surprises – the tiny bundles of life produced in this dry, hot world are the best of them all.



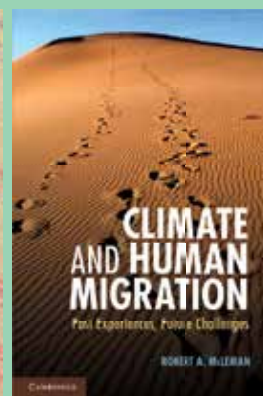
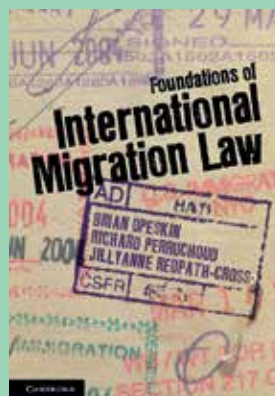
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# Perspectives on migration, trafficking and asylum



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**Cover**

A group of Sri Lankan refugees arrives in Tamil Nadu after a risky 30-mile boat ride across the Palk Straits. Find out more about the risks faced by victims of forced migration on p. 18.

