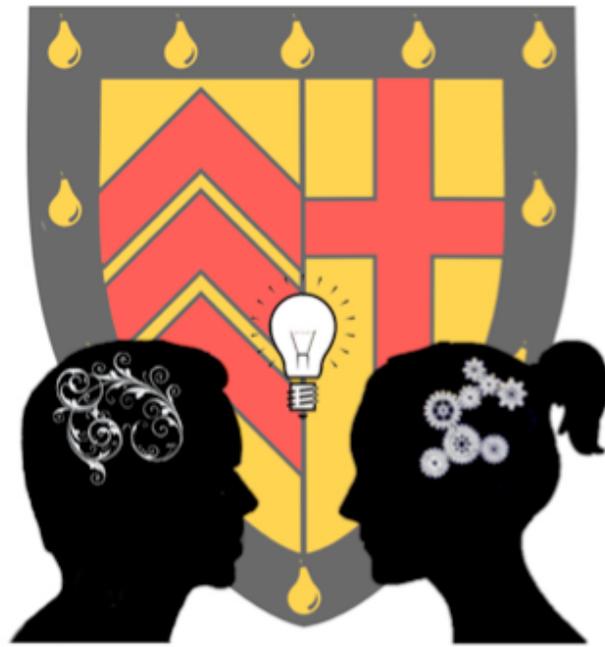


# Clareity symposium 2014



13 March 2014

Gillespie Centre, Clare College  
Cambridge



# Clareity symposium 2014



## Programme

10.50 – Registration opens, Gillespie Centre

11.10 – Welcome by the Clareity President, Jolle Jolles, and opening address by the Master, Professor Tony Badger, Riley Auditorium

### Panel 1: 11.20-12.05

Chair: Jolle Jolles, Clareity President

11.20 - 11.35 **Emma Cross:** Ocean acidification does not impact shell growth or repair in the Antarctic brachiopod

11.35 - 11.50 **Tiia Sahrakorpi:** Building the ‘New Man’: Moulding German youth through Nazi magazines, 1933-1938

11.50 - 12.05 **David Williams:** Who killed the mammoths? A prehistoric tale of murder, mystery and.. climate change

### Panel 2: 12.10-12.55

Chair: Ross Buckingham, MCR President

12.10 - 12.25 **Payam Gammage:** Genetically engineering a cure for human mitochondrial disease

12.25 - 12.40 **Tehmina Kazi:** Islam, racism and the dynamics of inter-racial marriages involving heritage Muslim women

12.40 - 12.55 **Megan Stanley:** Electron cats in nanoscale boxes: quantum physics in the lab

*12.55 - 13.40 Lunch break and poster session*

### Panel 3: 13.40-14.40

Chair: Meredith Shafto, Clareity CRA

13.40 - 13.55 **Adam Wurr:** The impact and ethics of paying ransoms to terrorist groups

13.55 - 14.10 **Aideen Foley:** Climate change mitigation through geoengineering: How might the global carbon cycle respond to ‘artificial volcanoes’?

14.10 - 14.25 **Ellen Quigley:** An Ecological Proposal: Environmental Investing for Endowments

14.25 - 14.40 **Rachel Silverman:** Confronting resistance: the ethical and economic implications of drug resistance in tuberculosis

**14.40 - 15.20 Keynote lecture by Prof Nicky Clayton: Ways of thinking: from crows to children and back again**

*15.20 - 15.40 Tea Break*

**Panel 4: 15.40-16.25**

Chair: Timothy Chesters, Clareity Fellows

15.40 - 15.55 **Jennifer Jenkins:** The source of Iceland's Volcanism: Deep Earth Imaging using Earthquakes

15.55 - 16.10 **Mark Agius:** Human self and the medical consultation; Combating stigma in the doctor patient relationship

16.10 - 16.25 **Jiho Han:** Beam shaping for High Power Lasers

**Panel 5: 16.30-17.15**

Chair: Kit Preston Bell, Clareity Dilettantes

16.30 - 16.45 **Dionysios Kyropoulos:** Developing the new chironomia: towards the revival of historical acting and gesture in Baroque opera today

16.45 - 17.00 **David Fairen-Jimenez:** Self-assembled architectures: metal-organic frameworks as novel porous materials

17.00 - 17.15 **Zoe Stewart:** Closing the loop: the use of the "artificial pancreas" in diabetic pregnancies

*17.15 - 17.30 Short tea break*

**Panel 6: 17.30-18.30**

Chair: Senior Tutor Clare College, Dr Patricia Fara

17.30 - 17.45 **Nathaniel Zelinsky:** V for Victory: the transnational 'victory culture' of WWII

17.45 - 18.00 **Edward Oughton:** Who's superconnected and who's not? Investment in the UK's Information and Communication Technologies (ICT) infrastructure

18.00 - 18.15 **Jelena Renic:** Preventing waste accumulation: recycling, incineration and compostable materials

18.15 - 18.30 **Maya Corry:** Beautiful young men in Renaissance art

18.30 – Closing of the Symposium by the Senior Tutor, Dr Patricia Fara

*18.30 - 19.15 Wine and nibbles in the Garden Room (everybody welcome)*

*19.30 – Dinner for speakers and chairs*

# Abstracts

## Panel 1: 11.20-12.05

### **Ocean acidification does not impact shell growth or repair in the Antarctic brachiopod**

Emma Cross, PhD student, Department of Earth Sciences and the British Antarctic Survey

Since the industrial revolution, there has been a dramatic increase in atmospheric CO<sub>2</sub> due to human activities, mainly through burning fossil fuels. The oceans have absorbed about a third of this excess CO<sub>2</sub> which has caused changes in the chemistry of the surface seawater. This has resulted in an increase in ocean acidity and a decrease in pH by 0.1 units which is predicted to fall a further 0.3-0.5 pH units by the end of the century. This process also reduces the availability of carbonate ions which animals use to build shells and skeletons, indicating the vulnerability of these taxa to this aspect of climate change. Brachiopods are probably the most calcium carbonate dependent organisms due to >90% of their dry mass residing in their shell and other support structures. The fastest rates of change in seawater chemistry are expected in the Southern Ocean as the cold temperatures have caused the naturally lowest carbonate ion concentrations on Earth. Despite this, a long-term experiment simulating predicted environmental conditions by 2100 has shown no impact on the growth rate and shell repair in potentially the most vulnerable species, the Antarctic brachiopod. Therefore, the ability of this species to continue shell production and maintenance suggests that the Antarctic brachiopod can acclimate to forecasted conditions. Comparable long term studies are crucial to increase our knowledge of the capability of these integral organisms to succeed in our changing world.

### **Building the “New Man”: moulding German youth through Nazi magazines, 1933-1938**

Tiia Sahrakorpi, MPhil student, Modern European History

The talk is on the concept of masculinity, heroism, and body culture as presented in official Hitler Youth magazines in Nazi Germany. German heroism and masculinity are two concepts that were deeply ingrained in the Hitler Youth movement, yet rarely find themselves at the forefront of historiography. Most relevant works focus on the hierarchical structure of the Hitler Youth and its place within the Third Reich through to the end of the Second World War. There is a dichotomy in Hitler Youth historiography: a focus on either politics or society. Neither of these approaches addresses the formation of gendered identities in this period. The influence of popular culture in shaping idealised roles for young men has been particularly overlooked, making this topic an interesting one from which to view the male perspective. In contrast, much has been written and discussed about women's roles within this period. Overall, this talk will shed some light onto the roles of young men in Nazi Germany as portrayed within magazines.

## **Who killed the mammoths? A prehistoric tale of murder, mystery and... climate change**

David Williams, PhD student, Department of Zoology

We live in a zoologically impoverished world: almost all the big animals that were alive 100'000 years ago are now extinct, from woolly mammoths and sabre-toothed tigers to giant wombats, giant sloths and things which really have no modern analogy. Why these extinctions occurred has been debated since they were first noticed, with prehistoric hunters and climate change both being blamed. The debate over the relative importance of these two factors is remarkably heated and vitriolic, so we decided, with no background in the subject, to weigh in and perform a quantitative statistical analysis. We looked at the patterns of extinctions across the world to see whether human arrival in a region, or climate change, explains more of the variation that we see, and found that a combination of the two was probably important, but that human arrival was definitely a key factor in driving these amazingly cool animals to extinction. I'll try to keep the stats to a minimum in the talk and instead outline how vastly different (and incredibly cool) the world was before these animals were lost and explain why this question is important for people, and animals, in the 21st Century.

### **Panel 2: 12.10-12.55**

#### **Genetically engineering a cure for human mitochondrial disease**

Payam Gammage, PhD Student, MRC Mitochondrial Biology Unit

Mitochondria, better known as the 'powerhouse' of the cell, are sub-cellular organelles responsible for various biochemical processes, including production of more than 90% of all cellular energy supply. Key to fulfilling this energetic role, mitochondria maintain many copies of a small genome, separate from that of the DNA contained within the cell nucleus.

Human genetic diseases can take many forms, often resulting from mutations of DNA contained within the cell nucleus. However, a subset of genetic disorders are also inherited through mutations of the lesser-known mitochondrial DNA (mtDNA).

Mitochondrial DNA mutations cause disease in approximately 1 per 6000 individuals in the UK; there are currently no treatments for mitochondrial diseases, and even palliative and management care options are extremely limited. One theoretical approach towards curing mitochondrial DNA-mediated diseases is to deliver designer-molecules to mitochondria which are capable of recognition and selective elimination of mutated mtDNA.

We have produced a genetic engineering platform capable of curing human cells of mitochondrial disease in such a way: the mitochondria-targeted engineered zinc finger-nuclease (mtZFN). Now moving into late-stage pre-clinical and soon early-stage clinical trials, our recently reported mtZFN technology shows great future therapeutic potential, and may well be the answer that patients with mitochondrial disease have been waiting for.

## **Islam, racism and the dynamics of inter-racial marriages involving heritage Muslim women**

Tehmina Kazi, Eric Lane Fellow, Clare College

Heritage Muslim women in the UK often face a backlash from their families for marrying outside their ethnic and / or religious communities, far more so than their male counterparts. My paper for the "Critical Muslim" journal seeks to establish the scale of the problem, examine why diverse theological perspectives on inter-racial and inter-faith marriage have not filtered down to the grassroots, and suggest innovative and more effective civil society responses to this issue. This includes "Hidden Heart," a ground-breaking documentary that I am the Executive Producer of, featuring three British Muslim women who married non-Muslim men. The documentary provides a nuanced and sensitive portrayal of cross-cultural relationships. It also chronicles the effects of the backlash on their own mental health, and how this affects community dynamics in turn.

## **Electron cats in nanoscale boxes: quantum physics in the lab**

Megan Stanley, PhD student, Department of Physics

On human scales we do not obviously observe the effects of quantum physics; many of the predictions are counter-intuitive. However, quantum physics gained acceptance because of its ability to describe what happens when energy and dimensions are very small. Some of the most interesting effects are often difficult to observe due to the interaction of an object with many other particles in an uncontrolled manner resulting in the destruction of a delicate quantum state. Semiconductor quantum dots provide a model system where such quantum states persist long enough to be manipulated and observed through strong interactions with light. However the surrounding semiconductor environment inherent to the quantum dot acts to destroy carefully created states in a nanoscale version of the processes responsible for our world appearing classical at first glance. Here we explore what can be observed, the potential for the use of quantum dots in future technologies such as quantum computing, and how we can attempt to overcome the challenges of working on quantum physics in a noisy world.

## **Panel 3: 13.40-14.40**

### **The impact and ethics of paying ransoms to terrorist groups**

Adam Wurr, MPhil student, International Relations and Politics

Hostage taking is an age old tactic that manipulates strong human emotional responses to secure a particular outcome for the hostage taker. Although international agreements have codified the behaviour of states in this regard (most notably through the Geneva Conventions) non-state actors, e.g. criminal gangs, pirates, insurgent and terrorist groups, continue to utilise hostage taking in an entirely unregulated manner.

Responding to hostage taking of a foreign national by terrorist groups in particular presents

the national government of that individual with a complex series of dilemmas. My proposed talk, which focuses on an area of my current research and builds on first hand experience as a British Diplomat, will concentrate on one of those dilemmas, asking why it is that some states chose to pay terrorist groups to secure the release of their nationals whilst others, e.g. the British, claim never to do so. Do the truisms that are attached to this debate e.g. that paying ransoms encourages further hostage taking hold true in the post 9/11 world, or are British lives being put at unnecessary risk because of an out-dated doctrinaire position. Then again how does it make strategic or ethical sense for the French Government to launch a military intervention to defeat an Islamist military advance in Mali in 2013 whilst allegedly facilitating ransom payments that run in to the millions to the very same group they are fighting.

Building on an approach I am developing whilst in Cambridge of delivering talks and lectures that attempt to demystify complex foreign policy issues for a non specialist audience I will make use of visual imagery and open questioning from the lectern to encourage the audience to place themselves in the mind of decision makers as they wrestle with the ethical ambivalence inherent in many aspects of foreign policy.

### **Climate change mitigation through geoengineering: how might the global carbon cycle respond to ‘artificial volcanoes’?**

Aideen Foley, Postdoc, Cambridge Centre for Climate Change Mitigation Research (4CMR),  
Department of Land Economy

Geoengineering projects that replicate the cooling effects of a volcanic eruption are being considered as a strategy to reduce anthropogenic climate change. However, while it is evident from modern and palaeo climate data that large volcanic eruptions can have a significant cooling effect on climate, the carbon cycle response to such volcanically-induced climatic changes is difficult to quantify. The difficulty arises due to uncertainties associated with reconstructions of atmospheric CO<sub>2</sub> levels in the Earth’s past, as well as the challenge of disentangling volcanic and other influences in the modern atmospheric CO<sub>2</sub> record. Therefore, in this research, recently published in the *Journal of Geophysical Research – Atmospheres*, three Earth System Models (SIMEARTH, CLIMBER-2 and CLIMBER LPJ) were used to simulate the effects of different magnitudes of volcanic eruption, from relatively small to very large, on the coupled global climate-carbon cycle system. Key differences between the models include the manner in which soil respiration and net primary productivity responses to temperature and atmospheric CO<sub>2</sub> are represented. While the models all simulate global surface cooling in response to volcanic events, results indicate that there is significant uncertainty concerning the response of the carbon cycle to volcanic eruptions. The implications of this research for geoengineering projects are discussed.

### **An Ecological Proposal: Environmental Investing for Endowments**

Ellen Quigley, PhD student, Faculty of Education

Calls for divestment from the fossil fuels industry have sounded on campuses all over the world since 2012, and yet the literature shows that the effectiveness of divestment in achieving

environmental goals is limited (Ansar *et al.*, 2013); other green investment schemes suffer from the realities of a global market built on high-frequency trading and institutions' use of fund managers who may be unwilling or unable to enact specific environmental policy changes. This paper examines the potential for university endowments to contribute to a low-carbon future through their investments by assembling in-house investment teams to make direct investments in long-term sustainability projects in combination with other approaches meant to diversify holdings and reduce risk. Using as a case study Cambridge University, whose £4.9-billion endowment is Europe's largest, this paper addresses the current state of ethical investment options on the market and proposes a hybrid solution to universities' ethical quandaries that incorporates elements of in-house investment and direct investment, shareholder engagement, and traditional Socially Responsible Investing (SRI) approaches. It concludes that university endowments can achieve healthy returns and maintain a low risk profile while actively contributing to the development of a green economy over the coming decades.

### **Confronting resistance: the ethical and economic implications of drug resistance in tuberculosis**

Rachel Silverman, MPhil student in Public Health

A decade since the landmark establishment of the Global Fund to Fight AIDS, Tuberculosis (TB), and Malaria, TB still ranks as the second leading global cause of death from an infectious agent, with an estimated 8.6 million new cases and 1.3 million deaths in 2012. Yet as with many infectious diseases, future progress is threatened by rapidly growing resistance to the most effective therapies, which is transforming tuberculosis from a curable ailment into an uncontrolled global health threat. Because drug resistance is often caused by a patient's previous poor adherence to first-line treatment – and because treatment of multidrug resistant (MDR-) and extensively drug resistant (XDR-) TB is characterized by high costs, complex regimens, long duration (typically within a hospital setting), toxic side effects, and low success rates – drug resistance creates several important ethical and economic dilemmas. This talk will introduce the causes and frequency of drug resistant TB, and discuss the implications of these increasingly prevalent forms of drug resistance for tuberculosis resource allocation and policymaking. In particular, it will touch on key ethical dimensions of this issues, including allocation of scarce financial and drug efficacy resources, relative cost-effectiveness, time horizon, equity, patient rights, and global externalities.

### **Panel 4: 15.40-16.25**

#### **The source of Iceland's volcanism: deep earth imaging using earthquakes**

Jennifer Jenkins, PhD student, Earth Sciences

What happens if you heat a liquid from beneath and cool it from the top? You get convection. Cool material on top sinks down and the hot material below rises up. Our planet is in exactly the same situation. At the surface it is cooled by space, and within it is heated by the hot core at the

centre. Though most of the planet is solid rather than liquid, it can still convect by deforming plastically over very long time scales.

We see this convection expressed at the surface by cool material sinking down in areas where the tectonic plates are subducted. However, the location of rising hot material, which is predicted to rise as narrow “plumes” from the top of the core to the surface, is still a contentious issue in earth science.

Iceland is one location where the large amounts of volcanic activity are thought to be caused by an underlying hot plume. Earthquakes from all over the world travel through the earth and are recorded by seismometers on Iceland. In my research I look at these earthquakes to see what they can reveal about the material they have travelled through. The narrow structure of plumes makes them very difficult to observe directly. Instead I analyse secondary temperature dependant observations: the depths where certain minerals transform into higher pressure structures, to try and deduce whether or not a plume is present beneath Iceland.

### **Human self and the medical consultation; combating stigma in the doctor patient relationship**

Mark Agius, Psychiatrist & CRA at Clare College

The Consultation, 'when a human person who is ill or believed himself to be ill reveals his symptoms to a doctor who he trusts' ,is the core of medicine. It leads to a diagnosis and hence a treatment plan. However what is called into operation in the consultation are deep issues related to the human self. The self may be challenged when a diagnostic label is given and consequently the person is labelled ill . The self may reject the role of being an ill person , or may become stigmatised because of the person’s previous understanding of the nature of illness. These difficulties can be addressed by open and honest discussion with the patient about the nature of illness and its consequences.

I describe a new development aimed at teaching medical students the process of a psychiatric consultation. Two medical students see the patient, and sometimes the patient’s family , together with a psychiatrist. They sit in a circle, and while one student takes notes, the other leads the consultation , being guided in his questioning by the psychiatrist. The patient has given his prior consent to this procedure, which is seen as a teaching exercise by all concerned. Much explanation of the diagnostic process and psychoeducation about the illness is given to both the student and the patient and his family during this process. Feedback from the patients and their families is usually that they have understood a great deal about their situation. It is felt that carrying out the consultation in this way does lead to a good doctor-patient relationship and does help to ward off stigma.

### **Beam shaping for High Power Lasers**

Jiho Han, PhD student, Institute for Manufacturing

Since its invention, lasers have become indispensable source of coherent light. Their use nowadays span from small laser pointers, optical drives reading and writing, laser marking, micro

machining, laser cutting and welding, surgical lasers, energy transport, interferometric measurement, fluorescence microscopes, optical fibre networks etc.; the list goes on. Of such applications, the research in the centre for industrial photonics focus on laser based manufacturing process technologies. My area of interest is in the high power laser beam shaping; modifying the transverse intensity profile of a beam to some other more useful shape. The oldest beam shaping problem is to get a top hat beam profile, which is useful in laser processing, since it ensures that the material is either removed or not removed at all, with no 'half hearted attempts'.

Last year, work on machining a phase hologram at an optical fibre tip was presented. The demonstrated concept may form the basis of a new beam shaping solution, with advantages in its compactness, mechanical robustness, permanent alignment, and low cost. The basic concepts around these will be discussed.

## **Panel 5: 16.30-17.15**

### **Developing the new chironomia: towards a revival of historical acting and gesture in Baroque opera today**

Dionysios Kyropoulos, MPhil, Faculty of Music

While the use of historical instruments is commonplace in productions of Baroque opera nowadays, the visual aspects of these performances often remain in the domain of modernity. Seventeenth- and eighteenth-century singers used an elaborate acting technique widely unknown to us today, and even though opera as an art form combines music and theatre, contemporary approaches to historically-informed performance of Baroque opera tend to mainly focus on the musical aspects. This paper sheds some light on chironomia, the art of historical acting and gesture, explores its importance for the operatic stage, and suggests possible ways for it to become a practical reality in the foreseeable future.

It begins by tracing the use of gestures as a means to convey affection to its roots in classical rhetoric and examines its connection with Baroque opera. It continues by demonstrating the similarities between the movement for historical instrument revival and a similar movement for gesture that is still in its infancy. Having created this analogy, aspects that allowed the historical instrument revival to achieve commercial and artistic success will be explored, and suggestions will be made for actions that could be taken to allow the development of a new chironomia in the foreseeable future.

### **Self-assembled architectures: metal-organic frameworks as novel porous materials**

David Fairen-Jimenez, University Research Fellow, Department of Chemical Engineering and Biotechnology

Self-assembled functional materials have emerged as an extensive class of materials with an extraordinary degree of variability. On a fundamental level, self-assembled materials symbolise the beauty of chemical structures and the possibility of modifying their individual chemical and physical properties. In particular, metal-organic frameworks (MOFs), one of the most exciting

developments in recent porous-materials science, have received great attention as an attractive way of combining structural diversity with multiple organic functionalities. MOFs are known for their extraordinarily porosities, being able to reach apparent surface areas up to 8,000 m<sup>2</sup> per gram of material. The fundamental understanding of the specific properties of these systems presents a critical importance in the necessary shift from today's fossil-based energy economy to a more sustainable economy based on hydrogen and renewable energy, as well as medicine applications, where nanotechnology has a fundamental impact to revolutionise cancer diagnosis and therapy.

My research concerns the development of new strategies for the study of MOF performance. I combine molecular computational techniques with a range of experimental techniques that include gas adsorption, neutron and X-Ray diffraction and in vitro studies for drug delivery applications. This combination of techniques presents several benefits. Firstly, experimental characterisation is crucial for an application under realistic conditions. On the other hand, simulations provide a detailed picture on the molecular scale that is not easily accessible from experimental methods. This allows studying in detail how the structure influences the adsorption performance and therefore forms an essential part in the identification and design of promising materials.

### **Closing the loop: the use of the "artificial pancreas" in diabetic pregnancies**

Zoe Stewart, PhD student, Clinical biochemistry

Diabetes is the most common medical condition in pregnancy, affecting up to 7% of pregnant women. High and low blood sugars (hyper and hypoglycaemia) result in adverse maternal and infant outcomes of diabetic pregnancies including major congenital anomaly, pre-term birth, miscarriage, stillbirth and death. Thus, the main treatment aim is to safely achieve blood glucose control as near as possible to normal. Current management is suboptimal, with women with type 1 diabetes spending 10-12 hrs daily with sugars outside the normal range.

The Cambridge 'artificial pancreas' team have pioneered technological advances using algorithms that link real-time continuous glucose monitoring with continuous insulin infusion (closed-loop insulin delivery or 'artificial pancreas'), resulting in more time at near-normal glucose levels. This technology has shown promising results including more time spent with near normal glucose and fewer episodes of low glucose overnight when trialled on small numbers of children, adults and pregnant women with type 1 diabetes under controlled conditions. However further studies are needed before the technology can be applied in clinical practice. This presentation will provide an introduction to diabetes and the application of technology including the artificial pancreas as potential treatment options. It will focus particularly on the use of the artificial pancreas to treat diabetes in pregnancy and explore future directions of research in this field.

**Panel 6: 17.30-18.30**

## **V for Victory: the transnational 'victory culture' of WWII**

Nathaniel Zelinsky, MPhil student, Department of History

In the summer of 1941, the British Broadcasting Corporation launched the “V for Victory” campaign, a propaganda program that gave birth to a symbol recognized around the world today: the two fingered “victory salute.” In my talk, I will discuss how the V for Victory campaign forged a transnational rhetoric centred around the concept of “victory” during the Second World War. That rhetoric became a common language for people separated linguistically, culturally and geographically — from South Africa, to France, to the United States, the United Kingdom, the symbol of “victory” was a rallying cry that linked a fragile anti-Axis movement around a unified theme.

If you had lived in occupied Europe from 1941-1945, you would chalked “victory V” signs onto walls. In the Allied countries, one ate food from victory gardens, smoked victory cigarettes, and wore victory clothing. And in America, African Americans formed the “Double V” a symbol for the simultaneous defeat of the Axis powers abroad and racism at home, allowing them to express both their patriotism and yearning for equality. I will discuss the ways in which this symbolism connected the Allied alliance into a unified movement.

Today, the V gesture continues strong. From the recent “Arab Spring” to the anti-communism movement of Eastern Europe in the 1980s, the symbol has allowed transnational political movements to share political ideals across borders. Understanding that sign’s unique origins as well as the broader campaign surrounding it contributes to our understanding of how people communicate in a globalized world.

## **Who's superconnected and who's not? Investment in the UK's Information and Communication Technologies (ICT) infrastructure**

Edward Oughton, PhD student, Cambridge Centre for Climate Change Mitigation Research (4CMR), Department of Land Economy

The UK's Information and Communication Technologies (ICT) infrastructure sector has considerably evolved in the past decade. Firms and consumers have required increased digital connectivity, especially faster and faster forms of fixed and mobile broadband. The speed of change in both the supply of ICT infrastructure, and the means by which firms and individuals demand connectivity services like broadband, has been dramatic. As the need to address poorly connected places rises to the top of the political agenda, decision makers need support in helping to identify the disparities in the supply of ICT infrastructure between different cities and regions. Indeed, investment in this sector is seen to be vital for safeguarding the UK's economic recovery and bolstering the digital economy.

Robust and complete quantitative data have been scarce for this deregulated and privately owned infrastructure system. However, this paper utilises new postcode data to comprehensively examine the UK's ICT infrastructure endowment. A cross-sectional analysis is conducted which analyses the differences in fixed broadband and mobile telecommunications infrastructure. This

analysis is conducted according to certain key variables, which include population density, urban-rural classification, and the size and structure of local economies. In comprehensively analysing the UK's ICT infrastructure system, we also are able to understand the key variables which drive the investment decisions of infrastructure service providers.

### **Preventing waste accumulation: recycling, incineration and compostable materials**

Jelena Renic, MPhil student, Advanced Chemical Engineering

We are constantly told about the merits of recycling and how it is crucial for reducing the amount of waste that goes into landfill. However, it is unknown to many of us what happens to our rubbish after it is collected. How much of it actually gets recycled? Why are so few of the items surrounding us made of recycled materials? After answering these questions, I will briefly look into two alternative ways of dealing with waste: incineration for energy production and compostable materials. Unfortunately, escaping from future depicted in WALL-E is not so simple and much research is being done to make the proposed solutions commercially viable.

### **Beautiful young men in Renaissance art**

Maya Corry, Postdoctoral Researcher, Department of History of Art

Numerous Renaissance paintings – by artists such as Leonardo, Raphael and Bronzino – depict extraordinarily beautiful young men. These paintings celebrate the perfection of youth, often in a more sensual manner than was ever the case for images of contemporary women. Scholars and curators have categorized many of these works as portraits. Often however, it is clear that the appearance of the sitter has been idealised to conform to a particular standard of loveliness, one that to modern eyes appears effeminate, or androgynous. In some cases, it is apparent that this process of idealisation has resulted in a 'portrait' that looks very little like the sitter, who in reality was older, uglier, and more 'manly'.

Why did Renaissance masters paint such works? Why were they so popular in early modern Italy? This talk will explore these questions, and propose some answers. Topics such as the sexual allure of these lovely youths, their spiritual potency, and moral status will be touched upon. Examination of these images can reveal much about Renaissance attitudes to beauty, masculinity and art – as well as providing a feast for the eyes!

# Poster Abstracts

## **Quantitative MRI for dementia with Lewy bodies**

Li Su, Postdoctoral researcher, Department of Psychiatry

Dementia with Lewy bodies (DLB) is the second commonest subtype of degenerative dementia in older people after Alzheimer disease. I will present a cross-sectional study (N = 70) that aimed to characterize DLB by quantitative MRI parameters, such as longitudinal relaxation time and transverse relaxation time. These parameters reflect potential pathological changes in tissue microstructures, which may be detectable noninvasively. Our findings support that DLB is predominantly associated with changes in posterior regions in the brain, and these quantitative measurements can detect subtle changes not seen on structural volumetric imaging. Hence, quantitative MRI may compliment other imaging techniques in detecting early signs of DLB and in understanding neurobiological changes associated with the disorder.

## **Heterogeneous structure in mixed-species corvid flocks in flight**

Jolle Jolles, PhD student, Department of Zoology

Flocks of birds in flight represent a striking example of collective behaviour. Models of self-organisation suggest that repeated interactions among individuals following simple rules can generate the complex patterns and coordinated movements exhibited by flocks. However, such models often assume that individuals are identical and interchangeable, and fail account for individual differences and social relationships among group members. Here, we show that heterogeneity resulting from species differences and social structure can affect flock spatial dynamics. Using high-resolution photographs of mixed flocks of jackdaws and rooks we show that birds preferentially associate with conspecifics and that, like high-ranking members of single-species groups, the larger and more socially dominant rooks position themselves near the leading edge of flocks. Neighbouring birds show closer directional alignment if they are of the same species, and neighbouring jackdaws in particular fly in very close proximity to one another. Moreover, birds of both species often fly in especially close proximity to a single same-species neighbour, likely reflecting the monogamous pair-bonds which characterise these corvid social systems. Together, our findings demonstrate that to understand the structure of groups – such as bird flocks – we need to consider the characteristics and relationships of the individuals within them.

## **The outcomes of a multiple sclerosis support centre; an analysis of a primary care group funded service**

Molly Spink, undergraduate, Department of Medicine

This case study examines the provision of therapy services at the Multiple Sclerosis Support Centre (MSSC) Chester. The centre has recently become the first voluntary body in the UK to be

commissioned by the NHS. Whilst a major part of the service provision is the delivery of Hyperbaric Oxygen Therapy (HBOT) to MS patients, the centre also provides other measurable forms of support. The study considers issues in separating out, defining, and hence measuring successful outcomes of such therapeutic services where impacts are both physical and psychological. A literature review highlights the low evidence base for HBOT in MS and compares this with demand and usage of the service at the MSSC. NICE guidelines list HBOT as a service that should not be used in MS because of poor scientific evidence. Despite this, uptake and demand for HBOT remain high. This is a particularly pertinent issue in relation to recent NHS reforms. This case study illustrates that commissioning based on local needs and perceptions draws not only on the scientific evidence base but also on ‘softer’ evidence, such as patient and clinician perceptions.

### **Differentiating psychotic depression from non-psychotic depression: a systematic literature review of structural and functional MRI studies**

Stuart O’Connor, Warwick Medical School, University of Warwick

Psychotic depression is widely accepted as a specific subtype of unipolar major depression. Magnetic resonance imaging studies have begun to investigate the neurobiological changes that differentiate this subtype of major depression from non-psychotic depression. This review collates the currently available evidence, with the aim of directing future study.

The Medline, PubMed & Embase databases were searched for any articles containing the words “psychotic depression” or “depressive psychosis” along with either “MRI” or “Magnetic Resonance Imaging”. Papers were then systematically analysed to identify those studies that directly addressed MRI changes in psychotic depression. Decreased frontal grey matter and insula cortex volumes show an association with psychotic depression. fMRI studies also suggest an association between altered activity in these regions and cognitive impairments in patients with psychotic depression. In contrast, the association with volume changes of the frontal white matter, ventricles, subgenual cortex, anterior cingulate cortex, parahippocampal gyrus, amygdala, parietal lobes and basal ganglia as well as the frequency of deep white matter lesions or hyperintensities is inconsistent or inconclusive. Volume changes of the whole brain, hippocampus and temporal lobes do not appear to show an association with psychotic depression.

Structural and functional changes in the frontal and insular cortex show a stronger association with psychotic depression than changes in putative emotional processing regions. Currently, there are few studies available and the sample sizes are small but future studies aimed at understanding the neurobiology of psychotic depression may benefit from a more detailed assessment of these two regions.

## **A review of long term potentiation and synaptic plasticity in glutamate receptors**

Nick Lonsdale, Undergraduate, Department of Medicine

Glutamate receptors play the key role in excitatory transmission within the CNS. Because of this, they play a central role in producing synaptic plasticity. This article reviews the structure of different types of glutamate receptors [AMPA, NMDA, Kainate and mGluR] and the implications of their intracellular mechanisms and how these may implement long term changes both at the synaptic membrane or intracellularly. It describes how these receptors play different roles in both LTP and DTP and proposes a brief model to how these are combined to produce adaptive plasticity. Using AMPA conductance and density as a central axis, the contribution of other receptors and interacting proteins are discussed as ways of manipulating this. Among those discussed are directly acting proteins such as AP2, NSF, PICK-1, GRIP and ABP, those more indirectly acting such as hippocalcin, NCS-1 and neuronal expression of CamKII, as well as long term genetic and expression control.