University of BRISTOL

Elizabeth Blackwell Institute for Health Research

Bristol Neuroscience Newsletter

October - December 2019

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Inside this issue:

£420K funding boost for Bristol dementia

Dr Scott Miners (Bristol Medical School) has been awarded a Senior Research Fellowship by Alzheimer's Research UK to investigate specific changes to blood flow in the brain in Alzheimer's disease. His project will explore the role of pericytes, specialised cells that help to maintain the blood-brain-barrier, a layer of protection for the brain that starts to break down during Alzheimer's disease.

Dementia is caused by physical diseases, most commonly Alzheimer's disease. This is the message at the heart of Alzheimer's Research UK's Share the Orange campaign, a major new awareness campaign fronted by actor Samuel L. Jackson. The campaign highlights the physical nature of diseases like Alzheimer's, in which the brain can shrink by as much as 140 grams (or about the weight of an orange). One of the physical processes involved in the development of Alzheimer's disease involves changes to the blood supply in the brain and thanks to the charity, Bristol researchers have received a vital funding boost to look at this aspect.

Dr Miners will work with brain tissue donated by people who died with Alzheimer's disease to look at pericyte cells more closely; the cells sit within the walls of blood vessels and work to regulate blood flow in the brain, and are essential in maintaining the structure and function of blood vessels.

Over the next four years Scott will determine whether changes to the pericytes and other changes to the brain's blood supply could reliably predict the development of Alzheimer's disease. He will also test potential new drug approaches with the aim of preventing the loss of pericytes and restoring blood flow, in the hope this staves off disease.

Image © Alzheimer's Research UK

EVENTS

Maths Poems Launch
7 November 2019, 18.30 - 21.00, School of Mathematics, Fry Building, Woodland Road

The Reluctant Machine Learner
8 November 2019, 13.00 - 14.00, Dan Goodman (Imperial College London), 43 Woodland Road room G.10

Generative models for analysing clinical neuroimaging data
8 November 2019, 15.00 - 16.00, Michael Brudfords (University of Bristol), venue TBC

Smoke, Mirrors + Creative Storytelling - helping audiences gain knowledge through experience
8 November 2019, 16.00 - 17.00, John Durrant (BDH), Psychology Common Room, Social Sciences Complex, 12a Priory Road

Science documentary film-making course
11 - 13 November 2019, Folly Farm Centre, Stowey, Pensford, Bristol BS39 4DW

Actin-dependent mechanisms of chromosome segregation in mammalian eggs
11 November 2019, 13.00 - 14.00, Binyam Mogessie (University of Bristol), C42 Biomedical Sciences Building

An introduction to digital health and use of data
12 November 2019, 9.30 - 16.30, central Bristol

Bristol Computational Biochemistry meeting
12 November 2019, 14.00 - 16.30, C42 Biomedical Sciences Building

Brain Anatomy course
13 - 15 November 2019, Course Director: Dr Paul Johns, Consultant Neuropathologist and Reader in Clinical Neuroanatomy, Birkbeck, University of London, Malet Street

Thrive: Staff Health and Wellbeing Roadshow
13 November 2019, 10.00 - 16.00, Richmond Building

Impact and commercialisation drop in
13 November 2019, 12.00 - 16.00, D23 Biomedical Sciences Building

Equality, Diversity and Inclusion (EDI) Conference: Building an inclusive environment
14 November 2019, 9.30 - 15.30, The Great Hall, Wills Memorial Building, Queens Rd

Clinical Research Network Open day
14 November 2019, 13.00 - 16.00, Level 5, Whitefriars Centre, Lewins Mead, BS1 2NT

Translation toolkit: Making Connections: Networking skills

FULL EVENTS LISTINGS ARE AVILABLE ON THE BN WEBSITE

14 November 2019, 13.00 - 17.00, Vox Coaching, Room G.02, 1 Cathedral Square

Neoconnectionism: Deep Learning Models of Cognitive Function

14 November 2019, 13.30 - 14.30, Chris Summerfield (Human Information Processing Lab, Experimental Psychology, Oxford University), Senior Common Room, Level 2 (2D17), Priory Road Complex

Neural Dynamics Forum

15 November 2019, 13.00 - 14.00, Jacques-Donald Tournier (King's College London)

CNU seminar

15 November 2019, 15.00 - 16.00, Anne-Lene Sax (University of Bristol), venue TBC

Functional dissection of hippocampus to prefrontal cortex connectivity

18 November 2019, 13.00 - 14.00, Andrew Macaskill (Department of Neuroscience, Physiology and Pharmacology, UCL), C42 Biomedical Sciences Building

Out with the old, in with the new: revolutionary approaches to the diagnosis of early Alzheimer's disease

19 November 2019, 12.30 - 13.30, Dr Dennis Chan (University of Cambridge), Lecture Theatres A & B, Dorothy Hodgkin Building

Workshops in Ecology and Behaviour

19 November 2019, 16.00 - 17.00, Dr Per Smiseth (University of Edinburgh), Life Sciences Building, G13/14 Seminar Room

Poverty Precipice: Exploring the social and environmental dimensions of mountain poverty

20 November 2019, 11.30 - 14.00, Room 2.10, Senate House, Tyndall Avenue, BS8 1TQ

Impact and commercialisation drop in

20 November 2019, 12.00 - 16.00, Life Sciences Building Pod 1

Bristol Veterinary School Research Mingle

20 November 2019, 13.00 - 14.00, Dolberry seminar Room, Langford campus

1st International 'Alan Turing' Conference on Decision Support and Recommender Systems

21 - 22 November 2019, The Alan Turing Institute, British Library, 96 Euston Rd, London NW1 2DB

EBI Health Data Science Research Strand launch and networking symposium

22 November 2019, 10.30 - 13.00, Seminar Room, University of Bristol, Beacon House

SAVE THE DATE: **Bristol Brain Research Day**

23 June 2020

Chemistry Building, Cantock's Close

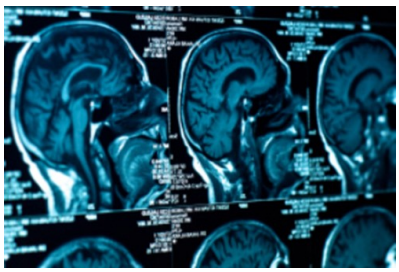
FULL EVENTS LISTINGS ARE AVILABLE ON THE BN WEBSITE

NEWS

Over 100 Bristol brains come together to talk Neuroscience

On 13 September 2019 the Bristol Neuroscience Research Network hosted a showcase to share the latest in brain research at Bristol University and to encourage interdisciplinary collaborations. The event, which had over 130 registered delegates, welcomed 14 new members of staff and provided a space for them to present their research, explaining its importance and the longer-term benefits it will bring to society.

The projects showcased included: Harriet Ball, a clinician working in dementia, trying to improve diagnoses and treatments for mild cognitive impairment; Paul Chadderton, a neurophysiologist, who is looking into sensory inputs and how this affects movement and motor learning; and Stephen



Montgomery, a natural scientist who studies the evolution of the brain. We also learned about sleep and how the lack of it changes the structure of brain cells, how neurodegeneration can help measure the progression of Parkinson's disease, and the mechanisms involved in controlling short-term memories, to name but a few more.

UoB staff and students are able to view some of the presentations on the Network's SharePoint site.

Robots can now learn to swarm on the go

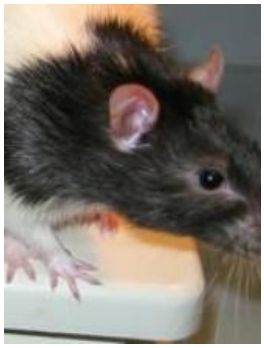
A team comprised of researchers from the Universities of Bristol and the West of England used artificial evolution to enable new generation of swarming robots to automatically learn swarm behaviours which are understandable to humans. By using a custom-made swarm of robots with high-processing power embedded within the swarm, the team were able to discover which rules give rise to desired swarm behaviours. This could lead to robotic swarms which are able to continuously and independently adapt in the wild, to meet the environments and tasks at hand. By making the evolved controllers understandable to humans, the controllers can also be queried, explained and improved. The development could create new robotic possibilities for environmental monitoring, disaster recovery, infrastructure maintenance, logistics and agriculture.

Engineers took advantage of the recent advances in high performance mobile computing to build a swarm of robots inspired by those in nature. Their 'Teraflop Swarm' has the ability to run the computationally intensive automatic design process entirely within the swarm, freeing it from the constraint of off-line resources. The swarm reaches a high level of performance within just 15 minutes, much faster than previous embodied evolution methods, and with no reliance on external infrastructure.

Jones S, Winfield AF, Hauert S and Studley M. Onboard Evolution of Understandable Swarm Behaviors. *Advanced Intelligent Systems*. Published online 18 July 2019.

Funding successes: Part 1

To David Stephens, Paul Martin (both Biochemistry) and Chrissy Hammond (Physiology, Pharmacology and Neuroscience) who have been awarded, with colleagues at Manchester University, a **Biotechnology and Biological Sciences Research Council** (BBSRC) Strategic Longer and Larger grant (sLoLa) for £4.5million (~£1.67m to Bristol). This is a 5 year grant to look at procollagen synthesis and deposition and the circadian cycle.



Emma Robinson, Jennifer Davies (Physiology, Pharmacology and Neuroscience) and Mike Mendl (Bristol Veterinary School) have been awarded a £400,000 National Centre for the Replacement, Refinement & Reduction of Animals in Research (**NC3Rs**) grant for *Do male mice prefer to live on their own?*

Jeremy Henley (Biochemistry) has been awarded a **Leverhulme Trust** grant for £273,925 to fund the project entitled *What do kainate receptors do in the brain and how do they do it?*

Mike Mendl, Liz Paul and Vikki Neville (Bristol Veterinary School), collaborating with Peter Dayan (Max-Planck Institute for Biological Cybernetics, Tubingen), have been awarded a £525k **BBSRC** grant on *Animal affect, welfare, and decision-making: a computational modelling approach*.

Loneliness competition winners announced

The Jean Golding Institute announced the winners of their recent competition in September 2019. Nina Di Cara (Bristol Medical School) and Tiff Massey (Analyst, Ernst and Young) won with their project *Is loneliness associated with movement for education?* The specific research question assumes that in most cases, movement for primary and secondary education is associated with upward social mobility. That is, moving to try to get into a better school than is available in their current local area. The team's research question was 'Is community-level loneliness associated with the quality of local schools, and how far can this be attributed to the movement of families pursuing upward social mobility through education?'.

The team explored several models and created novel metrics to explore the relationship between loneliness and movement education. They found the population change caused by moving of children aged 4-15 has a small impact on loneliness in communities. They hypothesised that the reason children of this age move, is mostly to pursue better educational opportunities and so movement for the purpose of education in primary and secondary students is associated with loneliness.

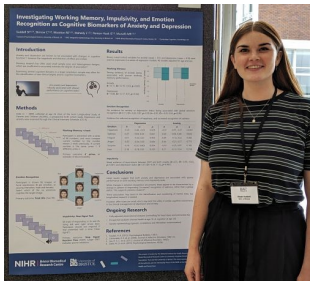
The winners received £1,000 in prize money and have also been invited to the Office for National Statistics (ONS) Data Science Campus to share new ideas for data analysis. They will also have the opportunity to present their findings and spend a "Day in the life" of a Government Data Scientist. Furthermore, their work will be showcased on the Data Science Campus website in blog form.

More about the competition

ONS have developed a loneliness index using open prescription data. The competition challenged participants to put forward a research question related to loneliness and movement for education, and answer it using the loneliness dataset provided.

Awards: Part 1

Members of the Tobacco and Alcohol Research Group attended the British Association for Psychopharmacology Summer Meeting, hosted at the University of Manchester on 14-17 July 2019 to present their research findings. Steph Suddell (PhD student, Psychological Science) was awarded a **BAP Summer Meeting Poster Prize** for her work entitled *Investigating Working Memory, Impulsivity and Emotion Recognition as Cognitive Markers of Anxiety and Depression*. These prizes are awarded based on the quality of the science, the merit of the hypothesis being tested, and both the visual and spoken presentation of the work.



Liz Humm, recent graduate from Psychological Science, won the prize for the **British Psychological Society's Undergraduate Project prize** for cognitive psychology. The BPS commented that there was 'a set of strong nominations and stiff competition' and the fact that Liz's project 'came out on top really serves to underscore the high quality of her work'. Liz's project, *Retrieval Practice: A Failure to Promote the Retention and Meaningful Learning of Conceptual, Theory-Based Material*, was presented BPS Joint Cognitive & Developmental Sections conference in September.

£1.8m to evaluate treatment for back pain

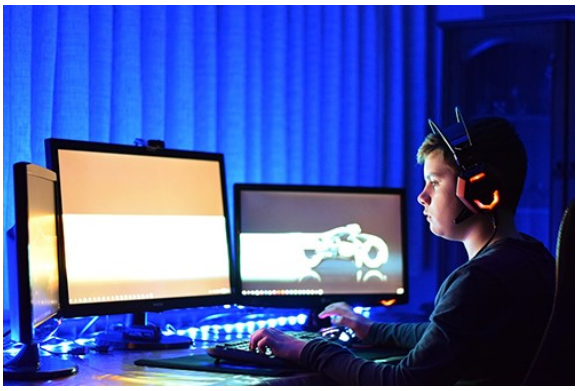
Researchers at the University of Bristol, in collaboration with North Bristol NHS Trust, the Universities of Keele and Southampton have been awarded £1.8 million from the National Institute of Health Research (NIHR) to evaluate a treatment for chronic severe low back pain. Led by Dr Vikki Wylde (Bristol Medical School), the RADICAL study will be a randomised controlled trial to find out if radiofrequency denervation, a procedure commonly used in the NHS, can provide pain relief.

Radiofrequency denervation involves placing a needle in the nerve to the painful joint, which is heated up to cause a break in the nerve. The purpose of this is to stop the nerve sending pain messages to the brain. Radiofrequency denervation is low risk and is used widely in the NHS, with around 13,000 procedures performed each year. Despite its widespread use in the NHS, it is not known how well this procedure works for reducing pain or whether it is a good way to spend NHS money.

To answer this question, the RADICAL trial will recruit 250 patients from pain management and spinal centres across the UK. Half the participants will be randomised to receive 'real' denervation and half to receive 'placebo' radiofrequency denervation. The placebo treatment will involve placement of the needle in the nerve but without heating it up, so the nerve is not affected.

Esports betting tweets and children

Over a quarter of those engaging with esports betting tweets are children under the age of 16, suggesting esports gambling may be as attractive to children as the computer games themselves. Conventional bookmakers are now offering esports odds in response to the growing popularity of professional competitive playing of computer games. 28% of those retweeting or replying to esports betting tweets in the UK are children under 16, rising to a staggering 45% worldwide. Analysis shows 74% of esports tweets appeared not to comply with advertising regulations. A report is calling for technology companies to make better use of age verification tools and adtech to screen out children from gambling ads, and for regulators to both continue to pursue those breaking the rules and consider tightening regulations.



Smith J (2019). Biddable Youth. Sports and esports gambling advertising on Twitter: Appeal to children, young and vulnerable people. Centre for Social Media Analysis at Demos and Agnes Nairn, Department of Management, University of Bristol.

Funding successes: Part 2

To Dr Lindsey Sinclair (Bristol Medical School) from **Dementia Platforms UK**, £2,700 for *Is neuroinflammation the missing link between depression and Alzheimer's disease?*, started July 2019 for one year.

To Dr Lucy Biddle (Bristol Medical School) from the **Wellcome Trust**, £22,146 for *Helping to prevent suicide in young people: a user-informed review of existing support services and their onward signposting strategies*, starting September 2019 for seven months.

To Dr Liz Coulthard (Bristol Medical School) from Alzheimer's Research UK, a Network Centre Grant, £48,500 from September 2019 for one year.

To Prof Geraldine Macdonald (Policy Studies) from the **Public Health Agency, Belfast**, £875,000 for the *Cochrane Developmental, Psychosocial & Learning Problems Group*, starting April 2020 for five years.

Dr Luisa de Vivo (Physiology, Pharmacology and Neuroscience) from the **Wellcome Trust**, £99,999 for *Sleep and emotional dysregulation: enduring effects of chronic sleep loss in adolescence* starting July 2019 for two years.

To Mrs Dinithi Wijedasa (Policy Studies) from the **Nuffield Foundation**, £136,475 for *Children in State Care in receipt of Mental Health service provision*, starting January 2020 for two years.

To Prof Matt Jones (Physiology, Pharmacology and Neuroscience) from the **Wellcome Trust**, a Sir Henry Dale Fellowship worth £1,289,212 for Shamik Dasgupta (joining us in March 2020 from the University of Cambridge) who will be working on *Neural & genetic control of path integration.*

An Elizabeth Blackwell Institute **Translational Acceleration and Knowledge Transfer award** went to Prof Emma Robinson (PPN) for *A novel, automated behavioural testing apparatus for rodents*.

£9 million boost for health research

Health researchers in the west country have been awarded £9 million from the Department of Health and Social Care (DHSC) to tackle the area's most pressing problems. The funding will enable new research projects including forecasting demand in hospitals, increasing people's physical activity levels, supporting people who self-harm and improving outcomes for children in care. The investment will help develop better health and care through research that aims to address the immediate issues facing the health and social care system. The money is part of a larger £135 million award over five years to 15 pioneering research teams across the country, known as NIHR Applied Research Collaborations (ARCs). These ARC teams build on the success of the NIHR Collaborations for Leadership in Applied Health Research and Care (CLAHRCs), which the ARCs replace from 1 October 2019. The team in the West, NIHR CLAHRC West has a strong track record of producing impactful research with a range of collaborators. The CLAHRC West team has worked on diverse projects including evaluating patient safety tools and the roll out of an intervention to reduce cerebral palsy in premature babies, exploring the experiences of Somali families affected by autism, creating harm reduction materials with people who inject drugs and improving how healthcare professionals respond to signs of domestic violence and abuse.

Awards: Part 2

Congratulations to Katy Sutcliffe and Kathryn Bennett, joint winners of the annual **Tocris Prize for the best 3rd Year PhD student talk** at the School of Physiology, Pharmacology and Neuroscience's postgraduate away day.

Further to the article in our last newsletter which announced they were shortlisted, we are delighted to say that PReCePT (Prevention of Cerebral Palsy in PreTerm Labour), a quality improvement programme led by clinicians at University Hospitals Bristol NHS Foundation Trust (UHB) and at the West of England Academic Health Science Network (AHSN), was not only shortlisted but *won* the **Health Service Journal** (HSJ) **Patient Safety Award** in the Maternity and Midwifery Services Initiative of the Year category. Through PReCePT, women going into early labour under 30 weeks are offered magnesium sulphate, which helps to protect their babies' brains. As a result, fewer babies are likely to develop cerebral palsy. PReCePT was originally developed in 2014 by Dr Karen Luyt, a neonatologist at UHB, working with colleagues at the West of England AHSN. Since then it has been rolled out nationally and is also running in tandem with the PReCePT Study, a research trial nested within the national programme, funded by the Health Foundation and in partnership with CLAHRC West.

Some patients denied access to smoking treatments

A new study from researchers at the universities of Bristol and Bath suggests that doctors should rethink which drugs they prescribe to help smokers with mental health conditions kick the habit. Their results highlight that the most effective drug at helping individuals to stop smoking is less likely to be prescribed to people with mental health conditions.

People with mental health conditions, such as anxiety or depression, are twice as likely to smoke compared to the general population. They tend to smoke more cigarettes per day, be more heavily addicted, and more likely to relapse when they try to quit. And whereas smoking rates in the UK have declined over recent decades, smoking rates have changed relatively little for people with mental health conditions. Most smokers wishing to quit are prescribed one of two common smoking cessation drugs: nicotine replacement therapy (NRT) or varenicline. Recent randomised trials and observational studies have found that patients prescribed varenicline are more likely to stop smoking compared to those prescribed NRT.

But there have been concerns around the psychological safety of varenicline, with doctors reluctant to prescribe the drug to smokers with mental health conditions. In fact, the best evidence shows that varenicline is not associated with worse mental health outcomes.

Taylor GM *et al*. (2019). Prescribing Prevalence, Effectiveness, and Mental Health Safety of Smoking Cessation Medicines in Patients With Mental Disorders. *Nicotine and Tobacco Research*. Published online 10 July 2019.

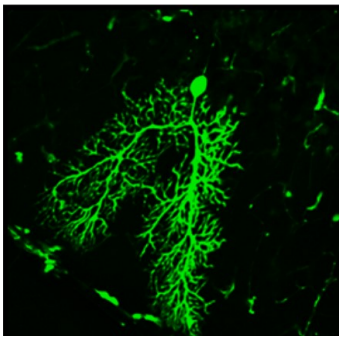
Best male biathletes 'more attractive'

Top male biathletes are more attractive to the opposite sex. This result, say the research team from the Universities of Exeter and Bristol, fits with the theory that women have an evolved preference for more athletic men, who in past times were better able to provide for their families. The scientists asked people to rate passport-style photos of 156 men and women who take part in the biathlon World Cup, a combination of cross-country skiing and rifle shooting. Male biathletes with a higher career-best score were judged as physically more attractive by the opposite sex, but there was no such relationship for female biathletes. The study is the first to show such a difference between perceptions of male and female athletes. The results imply that sporting success is linked to something visible in the photos that women find attractive. The study highlights how our evolutionary history has shaped the way we respond to other people's appearances.

Fawcett T, Ewans J, Lawrence A and Radford AN (2019). Attractiveness is positively related to World Cup performance in male, but not female, biathletes. *Behavioral Ecology*. 30(5), pp1436-1442.

Treating ataxia with bone marrow stem cell therapies

A team is using stem cell technology to help treat people with one of the most common inherited neurological disorders, Friedreich's Ataxia (FA). FA is the commonest of the inherited ataxias which affect co-ordination, balance and speech. It is caused by mutations in the FXN gene on chromosome 9, which reduces expression of a protein (frataxin) in cells. This stops the cells within the nervous system and heart functioning properly. There is currently no cure or treatment to slow disease progression, so treatments focus on relieving symptoms. A TRACK (Translational Acceleration and Knowledge) Award from the Elizabeth Blackwell Institute to Dr Alastair Wilkins helped fund his studies into using granulocyte colony stimulating factor (GCSF) to treat the disease. In rodents GCSF it has been shown to increase frataxin levels in cells, and to reverse the progression of a mouse model of the disease, by recruiting bone marrow stem cells to repair the damaged tissue. The team studied whether GCSF might do the same thing in human cells. In cell culture studies, they found that human FA cells treated with GCSF had similarly increased frataxin levels, and that the cells remained otherwise healthy. They then went on to perform a phase 2 clinical trial of the drug; GCSF caused release of bone marrow stem cells into the blood stream, and also elevation of levels of frataxin and other blood markers that are lowered in FA.



Brain Box Challenge reaches 3,000 milestone

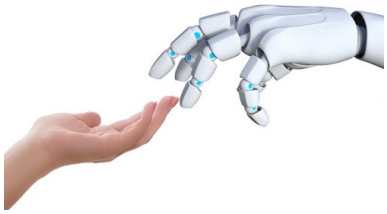
Primary school children across the West country and beyond have been learning about brain science since 2013 thanks to an award-winning outreach programme led by Dr David Turk (Psychological Science). In July 2019 a team led by PhD students Hugo Hammond and James Willmott visited two Year 6 classes at Kingsway Primary School in Gloucester. This event marked a significant milestone, having now engaged with more than 3,000 school pupils across the region.

The Brain Box Challenge is a free, hands-on practical workshop which educates primary school pupils in years 5 and 6 about what their brain looks like, how scientists study it, how it differs from animals and how it controls their behaviour. The session includes practical demonstrations, craftwork, games and brain puzzles as well as the opportunity to carry out some real experiments and see real brains!

In 2018-19 the team saw over 225 students in six separate visits to primary schools, including Kingsway (Gloucester), Buckfastleigh (Devon), Northleaze (Somerset), Horfield and St Pius (Bristol) and Farmborough (Bath). The workshop is part of the University's wider public engagement efforts, which regularly see staff and students sharing their work.

Life-like robots soon to be reality

Life-like robots that can make decisions, adapt to their environment and learn, are one step closer thanks to a team which has demonstrated a new way of embedding computation into soft robotic materials. Taking inspiration from biology, the concept of Soft Matter Computers (SMCs) aims to mimic the workings of the vascular system, where hormones such as adrenaline are released into the bloodstream and disperse throughout the body. When detected by a receptor, hormones then trigger responses in particular parts of the body such as increased blood flow in flight muscles and dilation of the pupils in the eyes. The team, led by Prof Jonathan Rossiter (Engineering), have successfully demonstrated a new mechanism that enabled computation to be embedded into three soft robots. In the paper, the team describe how a conductive fluid receptor (CFR) is a viable and fundamental building block for a range of SMCs and next-generation robots. In the future, soft matter computers could mirror this process by translating information within the structure of a fluidic tape that travels through the soft body of the robot, and then is detected by an appropriate receptor and then generates an output.



Garrad M *et al*. (2019). A soft matter computer for soft robots. *Science Robotics*. 4(3).

Mental Health in Young People research initiative

Mental Health in Young People is a new research initiative at the University of Bristol, led by the Elizabeth Blackwell Institute (EBI). It will look at ways to improve mental health and wellbeing for young people, with a particular focus on University students. Approximately one in four people in the UK will experience a mental health problem each year, and around 75% of adults with mental illness first experience symptoms before the age of 25. Students sometimes struggle; a recent analysis by Universities UK (UUK) highlighted a six-fold increase in the number of UK students who disclose a mental health condition to their university since 2007.

Once data is analysed to evaluate the impact of our wellbeing initiatives, researchers will take an evidence-based and thoughtful approach to developing and refining future approaches, ensuring that students at the University of Bristol can see the outcomes of the research they contribute to.

The Steering Group will be chaired by Prof Sarah Purdy, Pro Vice-Chancellor for Student Experience, and will have representatives from the Student Union; Student Services; Students Health Service; Development and Alumni Relations Office; Brigstow Institute; Bristol Health Partners; and academics from across the University.

Myles-Jay Linton (pictured) is the new EBI Vice-Chancellor's Fellow in Young People's Mental Health, a post closely linked with the initiative. He completed a PhD was in the economics of wellbeing (University of Exeter) and a postdoc with the NIHR CLAHRC WEST. His work will take a mixed-methods approach, drawing on both quantitative statistical methods and in-depth qualitative data collection with students and staff. A main focus will be investigating the challenges students face when transitioning into higher education.

Animal collectives should move like 'savvy gamblers'

Many animals have to move around in their environment to find resources to live and reproduce; this is especially true for animal collectives like ant colonies. A team has developed a more fundamental model of collective movement that generates predictions for how individuals in tight-knit groups should move, considering how their movement behaviour should be optimised for colony-level success at finding food. For example, ants should allocate their foragers to areas according to how likely they are to find food there. If this is the best strategy, evolution should have produced movement behaviours that result in ants preferentially spending time in areas with high probability of payoff. This results in mathematical models of movement that can be taken directly from statistical techniques originally developed in physics, to sample from complex probability distributions. The new framework generates theoretical predictions for the way highly-related collectives of organisms should move around, which in future can be examined experimentally in a wide range of biological systems.

Baddeley R *et al*. (2019). Optimal foraging and the information theory of gambling. *Royal Society Interface*. Published online 7 August 2019.

Study shortlisted for Research Project of the Year award

A research project focused uniquely on the missing voices and experiences of Syrian refugee fathers and the integration of their families has been recognised by the Times Higher Education (THE) Awards 2019. The British Academy research, shared with Profs Tina Miller (Oxford Brookes) and Esther Dermott (Policy Studies), has been shortlisted for the Research Project of the Year accolade recognising Arts, Humanities & Social Sciences.

Large-scale forced migration to Europe resulting from the war in Syria hit its height in 2015-2016. At the time, debates typically portrayed male migrants as being a problem and were often depicted as being aggressive and potentially a risk to society. However, such depictions ignore the fact that many of these men were also fathers with family responsibilities, including for their children's wellbeing. While existing research has documented aspects of refugee integration, it has focused primarily on individual refugees or mothers who are often regarded as primary actors in family lives. The research entails working with a Syrian research assistant and international collaboration with colleagues in the UK and Sweden to examine how the experiences of fathers, policies and integration processes differ between the two countries.

Insight is being shared across various arenas including the United Nations High Commissioner for Refugees in Geneva, a European Sociological Association conference and an event involving the participants themselves. The project has also provided a foundation for a proposal which has progressed to an advanced stage for a larger comparative research study focused on the UK, Sweden and Denmark. Based on the emerging findings, this new study will adopt new avenues of exploration.

International recognition for mental health researcher

Dr Duleeka (Dee) Knipe, Elizabeth Blackwell Institute Vice Chancellor's Fellow in Bristol's Centre for Academic Mental Health, was presented with the De Leo Fund Award by the International Association for Suicide Prevention (IASP) on 17 September 20169 at the 30th World Congress of the IASP in Derry, Northern Ireland. Dee's research has focused on achieving a better understanding of suicidal behaviour in low- and middle-income countries (LMIC), where 79% of the world's suicide deaths occur but which attract only a fraction of mental health research funding.

Her interest in this area started when she was appointed research co-ordinator on the world's largest randomised trial in suicide prevention initiative - a cluster randomised trial of lockable storage devices for pesticides in rural Sri Lanka with 165,000 individuals. Dee managed the baseline survey and designed all the study databases. This work and her work on investigating the impact of public health interventions (i.e. national pesticide bans) has contributed significantly to understanding the most effective method of suicide prevention in LMIC. Her pesticide regulation work is currently being used by the World Health Organisation (WHO) and policy makers in LMIC.

Dee with Prof Murad Moosa Khan, President of the International Association for Suicide Prevention

New research to improve mental health in young people

Four new research projects looking at different aspects of mental health in young people have been funded by the Elizabeth Blackwell Institute as part of the Mental Health in Young People research initiative (see p11).

Dr Oliver Davis: *Social media, help-seeking and peer support in student mental health*
Today's young people live their lives online, with little distinction between the online and offline worlds. This makes social media a rich source of information on real world behaviour relevant to mental health in this age group.

Nicholas Turner: *Seeking, accessing and barriers to student support for mental and emotional health problems – improving university services*
This is a priority for research as, in order to provide the most appropriate and useful support for the emotional well-being of students, we need to gain a better understanding of their help-seeking behaviours and what support is needed to enable access to university services.

Dr Lucy Biddle: *Helping to prevent suicide in young people/ students: a user-informed review of existing online support services and their onward signposting strategies*
Increasing levels of mental health crisis and suicide are being reported amongst UK student populations.

Dr Felicity Sedgewick: *Breaking down, dropping out: supporting mental health and academic achievement among autistic students*
Autistic people experience worse mental health (MH) than non-autistic people, however, they struggle to access appropriate support, leading to high rates of self-harm and suicide.

Childhood behaviour linked to paracetamol in pregnancy

A new study examined whether there were any effects of taking paracetamol in mid-pregnancy and the behaviour of the offspring between the ages of 6 month and 11 years, with memory and IQ tested up until the age of 17. Paracetamol is commonly used to relieve pain during pregnancy and is recommended as the treatment of choice by the NHS. The researchers found an association between paracetamol intake and hyperactivity and attention problems as well as with other difficult behaviours with young children that were not accounted for by the reasons why the medication was taken or social factors. However, this was no longer the case by the time the children reached the end of primary school. Boys appeared to be more susceptible than girls to the possible behavioural effects of the drug. The findings add to a series of results concerning evidence of the possible adverse effects of taking paracetamol during pregnancy such as issues with asthma or behaviour in the offspring. It reinforces the advice that women should be cautious when taking medication during pregnancy and to seek medical advice where necessary.

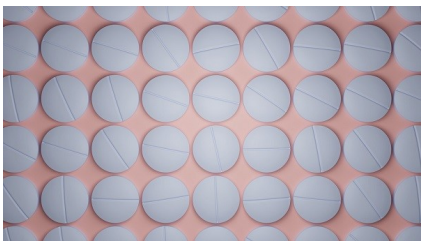
Golding J *et al*. (2019). Associations between paracetamol (acetaminophen) intake between 18 and 32 weeks gestation: a longitudinal cohort study. *Paediatric and Perinatal Epidemiology.* Published online 15 September 2019.

Antidepressants may reduce anxiety more than depression

One of the most common antidepressants, sertraline, leads to an early reduction in anxiety symptoms, commonly found in depression, several weeks before any improvement in depressive symptoms, a clinical trial involving researchers from the Centre for Academic Primary Care and Centre for Academic Mental Health has found. This is the largest ever placebo-controlled trial of an antidepressant, which has not been funded by the pharmaceutical industry.

By involving a wide range of patients including people with mild to moderate symptoms, the researchers surveyed a much wider group of people than most previous clinical trial samples. Sertraline did not appear to improve depressive symptoms, which include low mood, loss of pleasure and poor concentration, within six weeks. However, there was weak evidence that sertraline reduced depressive symptoms by 12 weeks.

Participants who took sertraline were twice as likely as those who took a placebo to say their mental health had improved overall. This is an important measure of improvement, from the patient's perspective, and can be used to gauge clinically meaningful treatment effects.



The researchers say their findings support the continued prescription of sertraline and other similar antidepressants for people experiencing depressive symptoms.

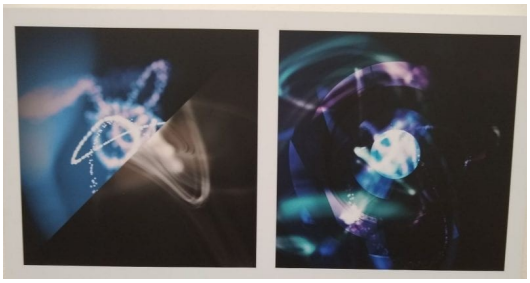
Lewis G *et al*. (2019). The clinical effectiveness of sertraline in primary care and the role of depression severity and duration (PANDA): a pragmatic, double-blind, placebo-controlled randomised trial. *The Lancet Psychiatry*. Published online 19 Sep '19.

Smoke signals: a lesson in mental health

In the UK, if your car breaks down, you can get help within 60 minutes. When your mind breaks down, it can take 18 months

Dr Robyn Wootton (Psychological Science) is a genetic epidemiologist studying mental illness, which affects 1 in 4 people every year– and its prevalence is rising at dramatic rates. Her current research looks at the association between tobacco/alcohol and mental illness. Smoking is much more prevalent amongst individuals with depression and schizophrenia than the general population. This was thought to be due to people with depression and schizophrenia smoking more in order to alleviate their symptoms; but recent research suggests that smoking can also increase your risk of developing depression and schizophrenia due to lasting changes to the brain. This is further evidence that we need to help individuals stop smoking both because of detrimental effects on mental health as well as physical health.

Robyn is using Mendelian randomisation (MR) to look at whether cigarette smoking really does increase the risk of developing schizophrenia and depression.

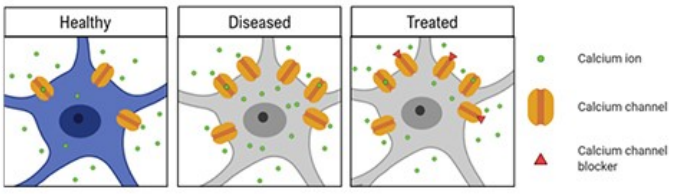


Robyn got involved with Creative Reactions this year, an initiative which explores the relationships between science and art. She was paired with Chris Bowles, who was particularly interested in how two identical twins, who share 100% of their genetic material, can be discordant for mental illness.

Calcium channel blockers and memory loss

A research team has identified that calcium channel blockers may be effective in treating memory loss associated with Alzheimer's disease. Using fruit flies, they found that diseased brain cells become overloaded with calcium ions, which at normal levels are important for memory formation. This overload was due to the overproduction of the gene encoding a channel (the L-type), which allows calcium ions to flow into the cell from outside. More of these channels means more calcium ions are able to flow into the cell, disrupting memory formation. Using a drug to block the channel reversed the effect of disease and reduced the flow of calcium ions to a normal level.

The team also investigated the memory of fruit flies by testing if they could remember which of two odours had previously been paired with an electric shock. While healthy flies remembered well, the diseased flies displayed impaired memory. However, if the overproduction of L-type channels was corrected in the diseased flies, their brain cells were no longer overloaded with calcium ions and their memory was just as good as healthy flies.



A diseased brain cell (middle) has more L-type channels, and consequently more calcium ions inside it, than a healthy brain cell (left). Treating the diseased cells with a blocker of the L-type channel reduced the number of calcium ions able to flow into the cell (right)

Higham JP *et al*. (2019). Restoration of olfactory memory in *Drosophila* overexpressing human Alzheimer's disease associated tau by manipulation of L-type Ca^{2+} channels. *Frontiers in Cellular Neuroscience.* Published 10 September 2019.

Bioethics, Biolaw and Biosociety Research funded projects

The Bioethics, Biolaw and Biosociety Research Strand specifically aims to foster inter- and multi-disciplinary research into the ethical, legal and social dimensions of health and the biosciences. Some of the projects supported following a funding call in March '19 include:

Mothering and Physical Activity: an exploratory project for public health
This study focuses on the context of post-partum women's engagement with physical activity, and seeks to theorize how the routines they encounter in their everyday lives shapes this engagement and (in)activity.

Understanding Causal Predictors of Mental Wellbeing
The core research question of this grant is 'What improves mental wellbeing?' To narrow the search, this project will focus on three ESRC strategic priority areas – education, social isolation and health behaviours (e.g. smoking, alcohol, physical activity).

Capturing Intangibles
This project will address these research objectives:

- Use the metaphor of "silence" to open an interdisciplinary dialogue about the Biosocial consequences of Climate Change (CC)
- Create a shared concept of "silence" as a boundary object to explore engagement with each-others work
- Explore measurement and assetization of "silence" to assign value to actions mitigating the Biosocial origins and consequences of CC

VOICES study

The VOICES study, funded by the National Institute for Health Research School for Primary Care Research is the first large-scale systematic review of research that draws solely on children's perspectives. It reveals not only the serious impacts of domestic violence and abuse on children's wellbeing but also the coping strategies children use and hopes they have for the future.

Researchers analysed data from 33 previously published qualitative studies of children and young people aged between three and 25. They found that the nature and severity of the violence experienced varied from hearing arguments to witnessing extreme acts of violence, in some cases ending in the death of a parent or carer.

Family and the wider social context were found to impact on how children experienced domestic violence. For some, living in already troubled families or neighbourhoods, domestic violence was just one aspect of violence in their daily experiences and identity. Children were found to cope with violence while it was happening using a diverse array of tactics and many, especially older siblings, actively attempted to protect others, such as siblings and mothers as well as animals. Impacts included profound feelings of fear, anxiety and emotional pain, lack of sleep and hypervigilance, and a desire for normality.

The team will be following up with detailed recommendations for professionals on how to respond appropriately to children.

Arai L *et al*. (2019). Hope, agency, and the lived experience of violence: A qualitative systematic review of children's perspectives on domestic violence and abuse. *Trauma, Violence, & Abuse*.

Links between adverse childhood experiences and self-harm

New research is the first to use a large generational family study to examine links between childhood trauma, the impact of inflammation and self-harm. Epidemiologists examined 4300 young people in Bristol's Children of the 90s study to see if adverse childhood experiences (ACEs) such as experiencing abuse, witnessing domestic violence or having separated parents are linked to self-harm at the age of 16.

They found that for each extra type of ACE, a young person is 11% more likely to self-harm at the age of 16, and 22% more likely to have self-harmed with suicidal intent. Researchers did not find any evidence that levels of inflammation taken from blood samples at the age of 10 years old were associated with childhood trauma and self-harm.

This (will) direct future research towards alternative biological and psychological pathways for the risk of self-harm and suicide. It also provides more evidence of the importance of preventing children from experiencing adversity, supporting the need for local authority initiatives like Bristol City Council who are developing an ACE-aware city, with interventions to help protect the mental health of future generations.

Russell A *et al*. (2019). Pathways between early life adversity and adolescent self-harm; the mediating role of inflammation in the Avon Longitudinal Study of Parents and Children (ALSPAC). *The Journal of Child Psychology and Psychiatry*.

Immersive VR documentary at Venice Film Festival

Virtual Reality film *The Waiting Room*, commissioned by the Virtual Realities – Immersive Documentary Encounters research project, premiered at the annual event which took place 28 Aug - 7 Sep 2019.

The Waiting Room, shown alongside some of the most important works of the year, is written by BAFTA winning documentary filmmaker, Victoria Mapplebeck, to document her breast cancer journey from diagnosis through to treatment and recovery. The project The project brings together computer science, psychology and documentary studies to investigate and support the unexpected adoption of Virtual Reality within Documentary and Journalism. Through the commission the study team can explore VR's potential, document the directorial processes of delving into VR for the first time and raise important ethical considerations.

The Waiting Room: VR explores the cultural myths and language of chronic illness, asking us to confront what we can and what we can't control when our bodies fail us. "We have made cancer our enemy," says Victoria, "a dark force to be fought by a relentlessly upbeat attitude. The Waiting Room is the antidote to the 'tyranny of positive thinking'. It challenges the cultural myths that surround this disease, putting under the microscope the language of illness. The Waiting Room begins with a personal journey but as cancer affects one in two of us over the course of a lifetime, it also tells a very universal story."

AI art

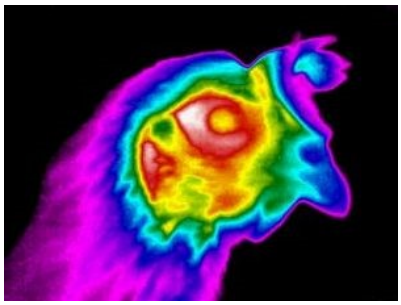
Art, it's in the eye of the beholder but has science found a way to identify what we really appreciate in paintings? The artistic tastes of individuals may have been finally unravelled thanks to a team of researchers, artificial intelligence (AI) and eye-tracking technology. The team conducted an experiment using AI to create a series of images with the same content but in the artistic style of Van Gogh or Cézanne. Volunteers were fitted with eye tracking devices pinpointing where their gaze was held while they were shown paintings either in the same style but different content, or the same content and different style. Participants were then asked to choose the painting they preferred. The eye-tracking data, which reflected the strength of the participant's preference for certain styles or contents in a painting, allowed researchers to analyse and identify what elements made the painting more visually appealing to the individual. They are working on a software algorithm that will provide automatic feedback about observers' aesthetic preferences by looking at how people look at paintings. This is a crucial step toward personalised exhibition tailoring.

Read more

Animal Welfare Research Network

The Animal Welfare Research Network, which is funded by the Biotechnology and Biological Sciences Research Council (BBSRC) and the Universities Federation for Animal Welfare (UFAW) and led from Bristol Veterinary School (Network Lead: Prof Mike Mendl; Network Manager: Poppy Statham), held its 4th Annual Meeting on 16 - 17 September 2019 at the Priory Road Complex on the central campus in Bristol.

Over 100 delegates from the UK and abroad attended the 2-day meeting with sessions covering topics including: 'Global Animal Welfare: International Collaboration, Funding and Global Challenges', 'Behaviour Change Theory and Practice', and 'New Developments in Animal Welfare Science'.



Dr Phil Burnet (Dept of Psychiatry, Oxford University) gave a plenary lecture and workshop on *Microbiome and the Gut-Brain Axis*, and there were breakout groups on ECR mentoring, finding evidence to promote positive animal handling, the costs of caring experienced by animal caretaker staff, applying human behaviour change in an animal welfare context, and designing cognitive bias studies.

Turing Hackathon

Some of the country's top talent from data science, artificial intelligence and related fields took part in the week-long hackathon held 5 - 9 August 2019 to analyse real-world data science challenges. The Turing Network Data Study Group, organised by the University of Bristol's Jean Golding Institute in collaboration with The Alan Turing Institute, brought together organisations from industry, government and the third sector, with talented multidisciplinary researchers from academia. Organisations act as Data Study Group 'Challenge Owners', providing real-world problems and data sets to be tackled by small groups of highly talented, carefully selected researchers who then brainstorm ideas and engineer data science solutions. The challenges included:

- *Bristol City Council* - Get Bristol moving: tackling air pollution in Bristol city centre

- *Rothamsted Research* - Tackling hidden hunger through soils
- *University of Bristol* - Machine learning for protein folding
- University of Surrey/Royal College of General Practitioners - Improving our ability to use routine data to inform the management of key disease areas
- *University of Bristol* - Applying AI and machine learning to reveal the molecular basis of heart disease
- *University of Bristol* Theatre Collection - The language of love: mining the correspondence of Oliver Messel

UK military families and domestic abuse support

Less than 10% of domestic violence and abuse (DVA) services identify themselves as providing specialist support to military families, according to a new report. from the Centre for Gender and Violence Research and funded by the Forces in Mind Trust (FiMT). The report also finds a lack of communication between the civilian and military sectors is hampering efforts to support victims and perpetrators of DVA within military families. Worryingly, many DVA services are unclear about the specific issues impacting military families and why specialist support is needed.

Researchers recommend civilian DVA services and military welfare services continue efforts to work more closely together to increase awareness and understanding of the support available, and to recognise the complexities victims from UK military families face when seeking help.

The report reveals how Armed Forces families see military based support as problematic,

lacking in confidentiality and some still view seeking help as a sign of weakness.

The perceived negative impact on their partner's career and losing entitlement to Service Family Accommodation were also reported as barriers to help-seeking. The report highlights the need for national level communication to create a joined-up support network which strengthens and better coordinates the services available and provides training for practitioners on the unique challenges faced by military families.

Read the full report

Poor diet can lead to blindness

Clinician scientists from Bristol Medical School and the Bristol Eye Hospital examined the case of a teenage patient who first visited his GP complaining of tiredness. Aside from being a "fussy eater," the patient had a normal BMI and height and no visible signs of malnutrition and took no medications. Initial tests showed macrocytic anaemia and low vitamin B12 levels, which were treated with vitamin B12 injections and dietary advice. When the patient visited the GP a year later, hearing loss and vision symptoms had developed, but no cause was found. By age 17, the patient's vision had progressively worsened; further investigation found the patient had vitamin B12 deficiency, low copper and selenium levels, a high zinc level, and markedly reduced vitamin D level and bone mineral density. Since starting secondary school, the patient had consumed a limited diet of chips, crisps, white bread, and some processed pork. By the time the patient's condition was diagnosed, the patient had permanently impaired vision.

Researchers recommend clinicians consider nutritional optic neuropathy in any patients with unexplained vision symptoms and poor diet, regardless of BMI, to avoid permanent vision loss.

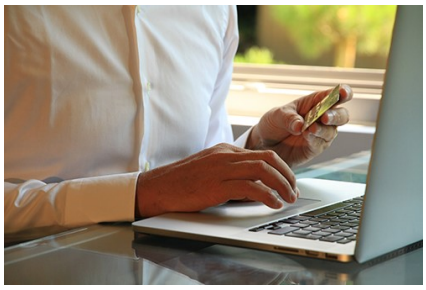
Atan D *et al*. (2019). Case report on blindness due to a junk food diet. *Annals of Internal Medicine*.

Kicking the gambling habit

With around one million people in the UK suffering the negative consequences of gambling, some banks have introduced spending controls or 'gambling blocks' to help their customers. But do these measures work and what more can be done?

A research partnership between the University of Bristol's Personal Finance Research Centre (PFRC) and GambleAware will examine how financial services organisations can best help people who experience, or are at risk of, gambling-related harm. Researchers will engage with people affected by problem gambling, those working in the gambling and financial industries - including high-street banks, lenders and debt collection agencies - as well as treatment and support organisations, to explore a range of ways to mitigate the financial losses and other harms inflicted by risky gambling behaviour.

The three-year programme will address growing concerns around the severe financial and social consequences of gambling. It comes as several UK banks - most notably Barclays, Monzo and Starling - have introduced 'gambling blocks'. Once turned on by customers, these essentially prevent spending on a bank card at gambling outlets. The first six-months of the programme will investigate the effectiveness of gambling blocks and how their potential could be maximised. Other topics might include practical guidance for financial services firms about how best to support customers affected by gambling; identifying effective financial self-help for gamblers; and the feasibility of a 'single gateway' for credit self-exclusion.



Read more

Fund for International Collaboration programmes

UK Research and Innovation's (UKRI) latest round of funding for International Collaborations has seen two of the ten funded projects awarded to Bristol researchers.

The first project, *Memory dynamics: the cellular architecture of systems memory*, received £411,000 and will be led by Prof Matt Jones (Physiology, Pharmacology and Neuroscience) together with Thomas McHugh at RIKEN. The project aims to solve the mystery of how sleep supports a healthy memory, by deciphering how engram neurons – the groups of neurons involved in learning specific memories – learn, process and remember new information. Answering these questions will improve our understanding of how the brain works and could lead to new treatments for illnesses such as dementia, depression and schizophrenia.

The second, *Functional interplay of ciliary trafficking complexes and motor proteins*, was awarded £460,000 and will be led by Prof David Stephens in in collaboration with Prof Kazuhisa Nakayama at Kyoto University. Cilia – microscopic, hair-like structures that extend from the surface of cells – are essential for human and animal development and are important in the formation and maintenance of bone, kidney function, signalling in the brain and many more body functions. This fundamental bioscience project aims to provide a fuller understanding of their structure and function, which is relevant in a wide range of fields such as the development of medicines to target common cancers.

Read more

An optimistic outlook 'means you live longer'

Optimists are more likely to live longer than those who have a more negative approach to life, a US study has found (as reported by the BBC). Positive people were more likely to live to the age of 85 or more.

The theory is that optimists may find it easier to control emotions and so be protected from the effects of stress. And researchers said pessimists could benefit from doing things like imagining a future where everything turns out well.

While a lot is known about the risk factors for disease and early death, far less is understood about what the researchers call "positive psychosocial factors" that could enable healthy ageing. Evidence from randomised control trials suggest that interventions, such as imagining a future in which everything has turned out well, or more intensive cognitive-behavioural therapy, can increase levels of optimism. Initial evidence from other studies suggests that more optimistic people tend to have goals and the confidence to reach them, are more effective in problem-solving, and they may be better at regulating their emotions during stressful situations.

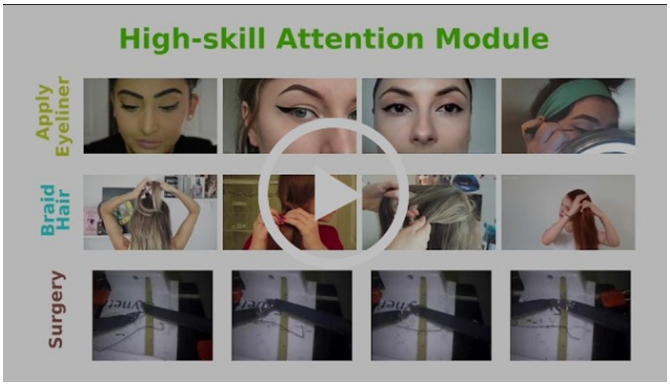
Prof Bruce Hood (Psychological Sciences) runs the University's science of happiness course. He said the study supported existing evidence of the benefits of positive thinking. Stress impacts on the immune system and so there is a possibility that this means that optimists cope better with infections.

Monty Python might have had a point...

Computer Vision and Pattern Recognition conference

The Bristol Visual Information Laboratory had several representatives at the Institute of Electrical and Electronics Engineers (IEEE) / Computer Vision Foundation (CVF) Computer Vision and Pattern Recognition conference held in Long Beach, California on 16 - 20 June 2019. Three papers were presented at the event, which welcomed 9,000 visitors.

- Mr Toby Perrett and Dr Dima Damen (both Engineering) presented *DDLSTM: Dual-Domain LSTM for Cross-Dataset Action Recognition*
- Mr Davide Moltisanti and Dr Dima Damen (both Engineering), in collaboration with Sanja Fidler (University of Toronto) presented *Action Recognition from Single Timestamp Supervision in Untrimmed Videos*
- Miss Hazel Doughty with Prof Walterio Mayol-Cuevas and Dr Dima Damen (all Engineering) presented The Pros and Cons: Rank-aware Temporal Attention for Skill Determination in Long Videos



Watch the video

Camouflage research project

Camouflage is not just an adaptation to the physical environment, but to the perception and mind of the viewer. Billions of photons enter the eye every second, so vision reduces the information to only that which is normally useful. Because shortcuts are taken, sensory systems can be manipulated, and this is what camouflage does.

Dr Karin Kjernsmo and Ms Sandra Winters (both Biological Sciences) will lead a Biotechnology and Biological Sciences Research Council-funded study that will apply novel computational methods ('deep learning')across three sub-projects, with different challenges and with different applications. All tackle long-standing, but unanswered, questions about the adaptive value of colour. Furthermore, the results will have direct application in the human domain.

The team, working under Principal Investigator Prof Innes Cuthill (£739,355 for three years), will focus on three sub-projects: snails, cats and military camouflage. These systems all have a solid research background but the colours operate at different spatial scales, against different viewers and, importantly, with different mechanisms for generating the patterns. They present opportunities for a new, integrated approach to studying coloration and the interaction between pattern development and evolutionary function.

Also on camouflage, Prof Cuthill was invited to write the Huxley Review for the *Journal of Zoology* which examines how prey camouflage manipulates and deceives the perceptual and cognitive mechanisms of the predator, through strategies such as background matching, countershading and masquerading.

Understanding our political nature

Prof Stephan Lewandowsky (Psychological Science) and fifty-nine other experts from across the globe who work in the fields of behavioural and social sciences as well as the humanities, have contributed to the research that underpins the European Union's Joint Research Centre (JRC) report that calls upon evidence-informed policy making not to be taken for granted. The report itself brings new insights into our political behaviour and this understanding has the potential to address some of the current crises in our democracies.

Recognising that advances in behavioural, decision and social sciences demonstrate that we are not purely rational beings, the *Understanding our Political Nature: How to put knowledge and reason at the heart of political decision-making* report brings new insights into our political behaviour and the understanding has the potential to address some of the current crises in our democracies. Sixty experts working in the fields of behavioural and social sciences along with humanities have contributed to the research that underpins the report.

Read the report on the European Commission's Science and Knowledge website.

Funding successes: Part 3

The **Engineering and Physical Sciences Research Council** has awarded Bristol Vision Institute researchers Dr Jo Hall (Psychological Science), Dr Paul Hill (Engineering), Ms Alexandra Malyugina, Jasmina Stefanov, Dr Brian Sullivan (Psych Science) and Aaron Zhang (Eng) funding for a project under the themes of visual immersion, finding and hiding things, and vision in motion. The team will investigate visual mechanisms in humans and other animals, relating these to analogous technology changes.

Anew £100 million institute is set to transform the way we create, utilise and evaluate new digital technologies to benefit our society now and in the future. Bristol engineers will work with social scientists, tech giants, corporations, local government and community partners to answer big questions and create transformational technologies for the future. The Bristol Digital Futures Institute (BDFI) is being funded by a £29 million grant from the **Research England UK Research Partnership Investment Fund** (RPIF) and £71m of match funding (£16m philanthropy and £55m from 27 partners including organisations such as BT, Dyson, BBC, Airbus and Aardman). It will be jointly led by Profs Susan Halford (Sociology) and Dimitra Simeonidou (Engineering).

Up to £8.2m from the **Medical Research Council**, **Wellcome Trust** with support from the University of Bristol will enable international research to continue into health, well-being and social science using data and samples from thousands of families thanks to the renewal of the Children of the 90s study. The study's future plans include using face-to-face data and sample collection along with a growing collection of remote data collection technologies. Read more

Working at Mental Health and Wellbeing

The Elizabeth Blackwell Institute hosted its 6th annual public lecture on 21 October 2019. Professor Dame Carol Black is expert government advisor on health and work, and an inspirational leader. She talked about her influential campaigns on mental health and wellbeing in the workplace, to a packed audience at the Wills Memorial Building.

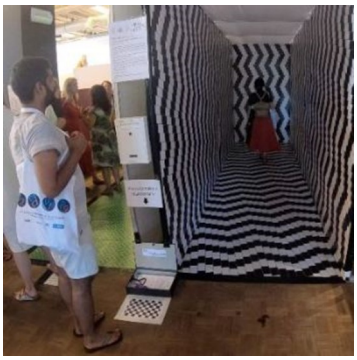
Her passion, she explained, is enabling individuals to have good health and well-being so that they find quality in life and purposeful activity. Such activity, she believes, is often work – paid or unpaid. Major barriers to this are poor mental health and wellbeing. The essential enablers of mental health and wellbeing in the workplace, she explained, are: leadership, Board engagement and manager capability.

Dame Carol chairs the board of Think Ahead, the Government's fast-stream training programme for Mental Health Social Workers and has compiled three independent reviews for the UK Government: the health of the working-age population; sickness absence in Britain; employment outcomes of addiction to drugs or alcohol, or obesity.

Watch the full lecture
View the slides
Image credit: photojB

Awards: Part 3

The Urban Vison Science team led by Dr Ute Leonards (Psychological Science) presented their research on how different environments and visual illusions affect people's walking behaviour and experiences of spaces at the Visual Science of Art Conference 2019 (VSAC) and the European Conference on Visual Perception 2019 (ECVP) both held in Leuven. PhD student Daria Burtan gave a talk entitled *Revisiting the Positive Impact of Visual Exposure to Nature: A Case of Aesthetic Preference?* and Greig Dickson was awarded 'Best Poster Presentation' for *Walking on Illusions – When Quantitative and Qualitative Methods Paint Different Pictures of the Link Between Perception and Action* at VSAC. The team engaged with participants and the general public through their interactive travel exhibition, Walking on the Café Wall.

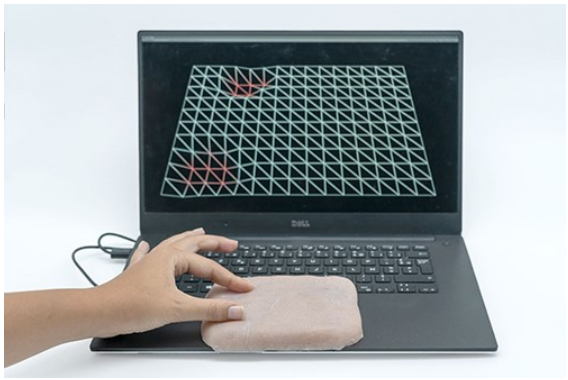


Prof Marcus Munafó (Psychological Science) and Dr Vera Castiglione (Modern Languages) have both been shortlisted for the third annual Wonkhe Awards. Marcus' submission looks at what universities can learn from the airline industry in learning from errors and Vera's submission questions whether the stresses and issues faced by students and staff are really that different. The awards celebrate the best of the higher education community's contributions to policy that helps drive forward the higher education debate for the benefit of the whole sector.

Artificial skin creates first ticklish devices

The Skin-On interface, developed by researchers in Engineering at UoB in partnership with Telecomm ParisTech and Sorbonne University, mimics human skin in appearance but also in sensing resolution. The team adopted a bio-driven approach to developing a multi-layer, silicone membrane that mimics the layers present in human skin. This is made up of a surface textured layer, an electrode layer of conductive threads and a hypodermis layer. Not only is the interface more natural than a rigid casing, it can also detect a plethora of gestures made by the end-users. As a result, the artificial skin allows devices to 'feel' the user's grasp – its pressure and location, and can detect interactions such as tickling, caressing, even twisting and pinching.

In the study, researchers created a phone case, computer touch pad and smart watch to demonstrate how touch gestures on the Skin-On interface can convey expressive messages for computer mediated communication with humans or virtual characters. The next step will be making the skin even more realistic.



Teyssier M *et al*. (2019). Skin-on interfaces: a bio-driven approach for artificial skin design to cover interactive devices. Presented at UIST 2019.

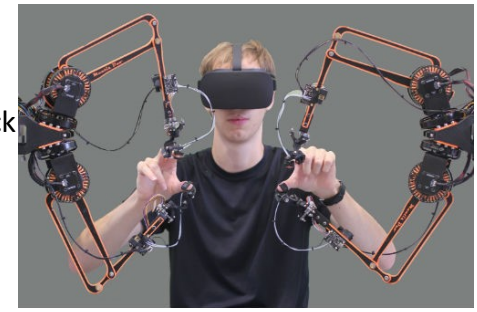
Watch the video

New haptic arm places robotics within easy reach

While multiple robotic arm devices already exist, most are heavy, expensive and outside the reach of individuals who lack the expertise to use them. Mantis, designed by experts in human-computer interaction, is the first system of its kind that enables light, affordable and accessible haptic force feedback.

Humans have five senses, but electronic devices communicate with us using predominantly just two: sight and hearing. Haptic feedback (haptics) changes this by simulating the sense of touch. Not only can you touch a computer or other device, but the computer can touch you back. A force feedback is a particular kind that can provide force.

Theoretically, the Mantis could be built and used by anyone upwards from a secondary school student, and at 20 times less the cost of the market equivalent because it uses components, including brushless motors, that cost significantly less than high-fidelity equivalents that are often confined to research labs.



Mantis expands on this innate (touch) ability by enabling people to touch and feel 3D objects, adding more depth to the VR experience

Lead researcher Dr Anne Roudaut (Computer Science)

Project Mantis is supported by a new a spin-out venture, Senmag Robotics, which it is hoped will enable them to progress their design to market, starting with the production and testing of the first kits ready for release by the end of the year.

Watch the video

Peer support groups for people with chronic pain

Sue Watkins (pictured) experiences long-term pain. After she attended an NHS pain management programme (PMP), she and a group of fellow PMP patients set up their own "follow-on" peer support group, with support of clinicians from North Bristol NHS Trust. Since then, as a patient volunteer, Sue has worked alongside researchers, clinicians and fellow patients to create tools to support the development of peer support groups for others living with chronic pain. They presented their findings at the British Pain Society Pain Management Programme Special Interest Group conference held 11 - 12 September 2019 in Bristol.

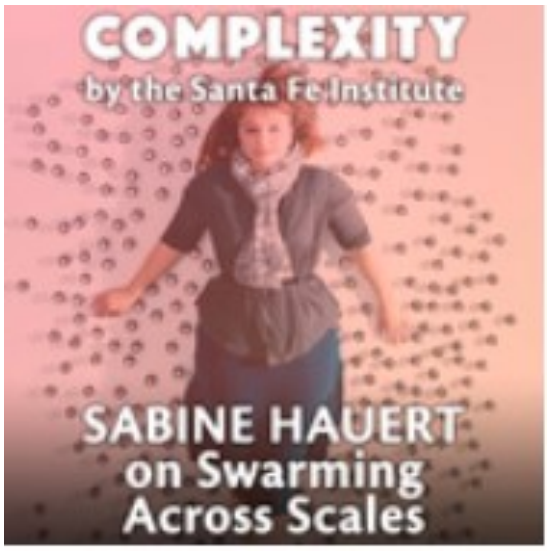
The team shared almost 200 leaflets with the audience, to help patients and clinicians develop peer support groups after NHS PMPs. These leaflets were co-designed with patient volunteers and people who had taken part in follow-on peer support groups. The leaflets are relevant for all clinicians who facilitate pain management courses and patients who take part.

Read more and obtain the leaflets

Swarming Across Scales

If complex systems science had a mascot, it might be the murmuration. These enormous flocks of starlings darken skies across the northern hemisphere, performing intricate airborne manoeuvres with no central leadership or plan. Each bird behaves according to a simple set of rules about how closely it tracks neighbours, resulting in one of the world's most awesome natural spectacles.

This notion of self-organising flocks of relatively simple agents has inspired a new paradigm of engineering, building simple, flexible, adaptive swarms that stand to revolutionise the way we practice medicine, map ecosystems, and extend our public infrastructure. We're living at the dawn of the age of the robot swarm – and these metal murmurations help us create communications networks, fight cancer, and evolve to solve new problems for an age that challenges the isolated strategies of individuals.



Sabine Hauert (Engineering) was a guest on the Complexity show, hosted by the Sante Fe Institute on 16 October 2019. In the episode, they talk about how swarms have changed the way we think about intelligence, and how we build technologies for everything from drug delivery to home construction.

Listen to the podcast

The writing is on the wall for medicine

A new Bristol mural in the Stokes Croft area of the city is providing an accessible and inclusive way of representing and communicating issues surrounding healthcare. This approach, known as Graphic Medicine, 'resists the notion of the universal patient and vividly represents multiple subjects with valid and conflicting points of view'. Graphic Medicine is intended to stand alongside more academic discourses and, at times, to enrich them, as new images and stories of illness and health emerge.

The mural, titled Wall #1, is by Brighton-based physician, comics artist and writer, Ian Williams. It was commissioned by the Centre for Health, Humanities and Science at the University of Bristol, with the support of the Elizabeth Blackwell Institute. The Centre exists to promote work at the intersection of humanities, medicine, health and science and is helping open the door to new arts-science collaborations by connecting researchers with clinicians and external partners for research focusing on philosophy and humanities.

The artist was keen to see how a comic strip would work on an elongated wall and chose a series of wordless panels to give a sense of the passing of time and the kind of things a doctor might see during a surgery.

Read more

Social eating

Previous studies found that those eating with others ate up to 48% more food than solo diners, and women with obesity eating socially consumed up to 29% more than when eating alone. This phenomenon is known as 'social facilitation'.

Experts at the Universities of Bristol, Birmingham and New South Wales found that eating 'socially' has a powerful effect on increasing food intake relative to dining alone, after evaluating 42 existing studies of research into social dining.

The team explain that ancient hunter gatherers shared food because it protected against periods of food insecurity – this survival mechanism may still persist today, leading to people eating more with friends and family because:

- Eating with others is more enjoyable and enhanced reward from social eating could increase consumption.
- Social norms might 'permit' overeating in company but sanction it when eating alone.
- Providing food becomes associated with praise and recognition from friends and family, strengthening social bonds.

The study highlights that, as with many other species, humans tend to share a common food resource. Most humans are no longer hunter-gatherers, but recent and rapid transition to a dietary landscape in which food is abundant has created forms of 'evolutionary mismatch' - inherited foraging strategies no longer serve their former purpose.

Ruddock H *et al*. (2019). A systematic review and meta-analysis of the social facilitation of eating. *The American Journal of Clinical Nutrition*.

Animal welfare and research 3Rs symposium

Scientists had the opportunity to find out about current research and share best practice of the '3Rs': Replace, Reduce and Refine at this year's University of Bristol Animal Welfare and Research 3Rs symposium, held over the Summer. At the event, the winners of the University's 3Rs competition were announced.

A research group in the School of Physiology, Pharmacology and Neuroscience won first prize for *A refined and translational method for assessment of novel antidepressants*. They have developed an alternative method to study depression-related biology in rodents, which avoids the need to use negative methods and has better translational validity. The affective bias test (ABT) is a simple bowl digging task based on associative learning and memory. Translated from clinical observations in patients with mood disorders and evidence that they experience impairments in reward-related learning and memory, the task requires animals to learn two independent pieces cue-reward association. The group found the ABT is effective in males and females and the test is a refinement to the traditional stress-based tests.

The feeling of music

On 19 October 2019 electronic music artist Aïsha Devi presented at We The Curious, the world premiere of *I Am Not Always Where My Body Is*, an unprecedented multi-user VR experience, commissioned by Simple Things and produced by Zubr.co in collaboration with Pussykrew with support from Smart Internet Lab, Brigstow Institute, Watershed, and South West Creative Technology Network (SWCTN).

The experience allowed a group of guests wearing VR headsets and headphones to get lost within a ten metre virtual space, alongside the holographic capture of Devi herself. Individual instrument tracks from the featured music piece were scattered around the environment, making the music sound different from every position; whilst guests playfully interacted with each other through their virtual avatar alter-egos. Viewers will collectively experience this 3D performance through an innovative mixed reality technology developed with VR specialists Zubr.co. The Swiss-Nepalese Electronic music artist leads the ritual-like audio experience through her holographic persona, whilst each participant assumes the virtual form of an anthropomorphic character.

Suicide prevention in low- and middle-income countries

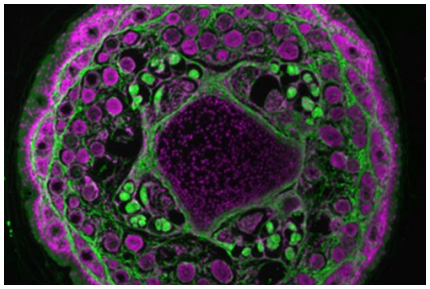
Future treatment and prevention of suicidal behaviour in low- and middle-income countries (LMIC) should involve a wider range of approaches beyond just the treatment of psychiatric illness. There are 800,000 suicide deaths annually, and the vast majority (76%) are from LMIC. However, current evidence into suicide prevention is largely based on high-income countries (HIC) and suggests more than 80% of suicidal behaviour is linked to psychiatric disorders. This study is the first systematic review of the association between psychiatric disorders, such as depression, anxiety and schizophrenia, and suicidal behaviour in LMIC. An international team from the universities of Manchester, Birmingham, Bristol, Sheffield Hallam, Nottingham, Western Sydney and National Taiwan University, analysed data from 112 studies on 30,030 episodes of non-fatal suicidal behaviour and 4,996 suicide deaths in 26 LMIC. The research, which aimed to address the issue of suicide prevention in LMIC, found 58% of suicide deaths and 45% of non-fatal suicidal behaviours were linked to psychiatric disorders. They also found that the proportion of psychiatric disorders in suicidal behaviour was highly variable, possibly reflecting between-country differences.

Knipe D *et al*. (2019). Psychiatric morbidity and suicidal behaviour in low- and middle-income countries: A systematic review and meta-analysis. *PLOS Medicine*.

Ageing and wound healing and the circadian cycle

Researchers from the Universities of Manchester and Bristol have been granted £4 million to investigate how cells govern the processes of ageing and wound healing and how this is influenced by the circadian (day/night) cycle. Their findings could help to improve wound healing and identify strategies to treat diseases .

The joint award, led by Prof Karl Kadler at Manchester, was made by the Biotechnology and Biological Sciences Research Council (BBSRC) as part of its strategic Longer Larger (sLoLa) grants call in Frontier Bioscience, which aims to advance our understanding of the fundamental biology of living systems. Prof David Stephens (Biochemistry) is leading the Bristol component. The collaboration will focus on the cell biology of matrix synthesis, how the component molecules are transported within cells and secreted, the circadian timing mechanisms that coordinate these processes, and the interactions between the immune system and matrix. The teams will pool their multidisciplinary expertise in fundamental aspects of cell and tissue biology, integrated experiments using *in vitro* and *in vivo* models, circadian biology, mathematical modelling, and novel synthetic scaffolds, with a particular focus on how the collagen matrix is controlled in the short term across a circadian cycle and, in the long term, across the life course. They will investigate how collagen is made and how it is used in the body, how it responds to damage, and how the day/night cycle and our immune systems affect this.



Update nearest relative criteria under Mental Health Act

The system in place under the Mental Health Act that places decision-making powers in the hands of the nearest relatives for people who are sectioned needs to be extended to others to improve patient choice. The study, by the universities of Bath, Bristol and the University of the West of England, identifies challenges to the existing system and makes recommendations for policy-makers and practitioners. Under the Mental Health Act 1983 people detained with mental health problems can be given compulsory treatment in hospital. The current system assigns a 'nearest relative' as the person who can act on behalf of a patient. However, this system is often problematic.

The study follows an Independent Review which found that the nearest relative role limited choice for patients. The government pledged to replace the role with a new Nominated Person role, but as yet no proposals have yet been put forward to address this. The authors argue for greater use of advanced choice documents, which would enable users of mental health services to make clear who they wish to be their Nearest Relative, and what and with whom information should be shared.

Dixon J *et al*. (2019). Treading a tightrope: Professional perspectives on balancing the rights of patient's and relative's under the Mental Health Act in England. *Social Care in the Community*.

Collaborations for data science and digital technologies

A formal partnership has been agreed between the University of Bristol and analytical instrumentation provider **Malvern Panalytical**.

The Memorandum of Understanding formalises the organisations' relationship and focuses on mutual areas of interest and collaboration, including data analytics, machine learning, artificial intelligence, and the science underlying the structure and properties of materials. A key aim of this collaboration is to establish a pipeline of talented graduates, equipped with skills and expertise in the fields of data science and digital technologies.

Read more

A collaboration between the University of Bristol's Jean Golding Institute for Data Science and the **Strathmore University Business School** in Kenya, will focus on using data science to address contemporary challenges facing Kenya and other African countries. The partnership will involve an exchange of ideas and people between the two institutions, sharing expertise, connecting researchers across disciplines and facilitating research projects. The aim is to produce high-quality academic research which addresses societal challenges in an African context, across sectors as diverse as healthcare, agriculture, wildlife conservation, disaster response, geospatial modelling, communications and economics.

Prof Kate Robson Brown, Director of the Jean Golding Institute, with Dr George Njenga, Executive Dean of Strathmore University Business School

The unintended consequences of healthcare apps

People are living longer, but often with multiple long-term health conditions. Maintaining people's quality of life in these circumstances requires a lot of support from the NHS.

At the same time, GPs are under pressure to improve patients' access to healthcare while coping with their own workloads and growing patient demand. Policymakers are proposing new ways to relieve the strain by using digital technologies such as phone apps to improve the convenience and reduce the cost of healthcare. The move towards 'digital first' care is explicit in the new NHS Long Term Plan. Hundreds of thousands of health apps are already available in app stores, targeting fitness, wellbeing and general health as well as specific conditions. These developments are set against a backdrop of well-known challenges for healthcare app innovation. For example, evidence exists that some apps can help patients, but many have not had their effectiveness rigorously tested or the reliability of the information they provide assured. Some other possible consequences are less well understood, for instance, whether digital health tools will close or widen existing health inequalities, as well as what the impact will be on people's relationships and communication with their GP, on GP workload and how GPs use health apps with patients. The DECODE study aims to produce guidance on the unintended consequences of digital health tools for all stakeholders.

Long-term growth for life sciences in the south west

A GW4 opinion piece by Richard Seabrook, the Elizabeth Blackwell Institute Advisor on Business Development that appeared on 23 September 2019, argues that For the first time Life Sciences has been properly recognised locally as an enabler of growth.

A recent successful collaboration with GW4 achieved recognition for life and health sciences innovation in Bristol and the South West of England for the relaunched UK Industrial Strategy Life Science Sector Deal. The University of Bristol have been working alongside partners such as Invest Bristol and Bath, Bristol Health Partners, University of Bath and UWE, on the West of England Combined Authority local Industrial Strategy (WECA), which was launched this July. WECA's first ever Local Industrial Strategy sets out how the area will contribute towards delivering the national Industrial Strategy's aim to raise productivity levels and create high-quality, well paid jobs across the country. The strategy mentions Life Sciences as a sector growing at pace and draws on the unique strengths of the region, underlining their ambition to be a driving force for clean and inclusive growth.

Examples from UoB include two spin out companies: KWS BioTest Ltd, a leading contract research organisation specialising in immunology oncology discovery testing services; and Ziylo Ltd, a specialist chemistry company which could transform the treatment of diabetes improving the lives of millions of people around the world. Novo Nordisk acquired Ziylo Ltd in staged acquisition with a potential deal value that could exceed £640M. BrisSynBio, a BBSRC/EPSRC funded Synthetic Biology Research Centre at the University, is especially noted as an engine of growth having nurtured the translation of research into four companies (Zentraxa, Cytoseek, Imophoron, and Alpha Nanopore) with two more in the pipeline.

Spin-out raises £760,000 for biosensing technology

Rosa Biotech, a new UoB spin-out which developed a sensing platform capable of detecting the faint chemical signature given off by chronic diseases, has raised £760k to commercialise this innovation. The artificial Intelligence (AI)-driven biosensing technology, which mimics mammals' sense of smell, has significant potential to transform the medical diagnostics and pharmaceuticals industries. From early disease diagnosis to enhancing industrial biotechnology, there is an ever-growing need to analyse complex biological mixtures. Most techniques rely on the expensive and time-consuming process of developing bespoke tests for specific molecules.

Inspired by the highly refined ability of dogs to smell malaria, Parkinson's and other life-changing diseases, researchers demonstrated its strong potential to a wide range of sensing and diagnostic challenges. Prof Dek Woolfson leads the team at the Bristol BioDesign Institute who developed the technology. They built a series of barrel-shaped proteins that resemble proteins of the mammalian olfactory system, but are much simpler, easier to make and easier to handle. Arrays of different barrels are loaded with a dye and exposed for analysis; molecules in the sample dislodge the dyes but to different extents across the array, giving coloured patterns that are analysed using machine learning. Recording patterns for healthy and diseased samples will help build sensors for early-stage diagnosis of disease.

The UK Reproducibility Network (UKRN)

(UKRN) is a peer-led consortium that aims to ensure the UK retains its place as a centre for world-leading research.

This will be done by investigating the factors that contribute to robust research, promoting training activities, and disseminating best practice, and working with stakeholders to ensure coordination of efforts across the sector.

It is led by Marcus Munafò (Bristol), Chris Chambers (Cardiff), Laura Fortunato (Oxford), Alexandra Collins (Imperial), and Malcolm Macleod (Edinburgh).
UKRN works across disciplines, ranging from the arts and humanities to the physical sciences, with a particular focus on the biomedical sciences.

As part of this collaborative partnership, the University has created an Academic Lead for Research Integrity and Improvement role, working closely with the Pro-Vice Chancellor for Research to improve the robustness of Bristol's research activity.

UK Reproducibility Network

The University already has an active local network of researchers at all career stages – one of over 40 local networks supported by UKRN across the country – that works to share best practice across disciplines and discuss relevant topics such as open research practices.

Formal support for UKRN builds on this activity and demonstrates Bristol's commitment to world-leading research. As the number of institutions supporting UKRN increases, so will opportunities for coordinating activity and sharing best-practice and training.

Smoking increases risk of depression and schizophrenia

Smoking is much more common amongst people with mental illness – especially depression and schizophrenia. However, most studies that have looked at this association have not been able to disentangle whether this is a cause-and-effect relationship, and if so in which direction. Does mental illness increase the likelihood of smoking, or is smoking itself a risk factor for mental illness?

Researchers from the University's Tobacco and Alcohol Research Group with support from Bristol's MRC Integrative Epidemiology Unit and the NIHR Bristol Biomedical Research Centre applied Mendelian randomisation on UK Biobank data and found evidence that tobacco smoking increased risk of depression and schizophrenia, but also that depression and schizophrenia increase the likelihood of smoking (although the evidence was weaker in this direction for schizophrenia).

The study adds to a growing body of work suggesting that smoking can have adverse effects on mental health (see *Smoke signals* article on p15).

Wootton R *et al*. (2019). Evidence for causal effects of lifetime smoking on risk for depression and schizophrenia: A Mendelian randomisation study. *Psychological Medicine*.

Evidence for memory consolidation

Neural activity encoding recent experiences is replayed during sleep and rest to promote consolidation of the corresponding memories. However, precisely which features of experience influence replay prioritisation to optimise adaptive behaviour remains unclear. Here, we trained adult male rats on a novel maze-based reinforcement learning task designed to dissociate reward outcomes from reward-prediction errors. Four variations of a reinforcement learning model were fitted to the rats' behaviour over multiple days. Behaviour was best predicted by a model incorporating replay biased by reward-prediction error, compared to the same model with no replay; random replay or reward-biased replay produced poorer predictions of behaviour. This insight disentangles the influences of salience on replay, suggesting that reinforcement learning is tuned by post-learning replay biased by reward-prediction error, not by reward per se. This work therefore provides a behavioural and theoretical toolkit with which to measure and interpret replay in striatal, hippocampal and neocortical circuits.

Roscow EL, Jones MW, Lepora NF (preprint). Behavioural and computational evidence for memory consolidation biased by reward-prediction errors.

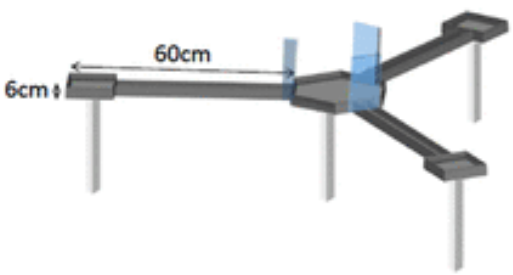


Illustration of the maze used to train animals. Lick ports located at the end of each arm delivered reward with either high, medium or low probabilities

ELIZABETH BLACKWELL FUNDING

EBI Clinical Primer scheme

This scheme is aimed at clinically qualified medical, veterinary and dental trainees who are at an early stage of their career.

Closing date: 14 November 2019

EBI Identifying Candidates for Wellcome Trust Investigator Awards

This scheme is designed to support a small number of permanent academic staff at UoB within the first five years of their appointment, who are planning to apply for an Investigator Award from the Wellcome Trust. Applications will be accepted on a rolling basis.

Heads of School are asked to nominate members of staff who can be eligible for this scheme by emailing ebi-health@bristol.ac.uk

Closing date: none

EBI Workshop Support

Support interdisciplinary workshops in health research at new or emerging interface between two or more disciplines. Applications reviewed all year.

Closing date: none

Returning Carers Scheme

To support academic staff across all faculties in re-establishing their independent research careers on return from extended leave (16 weeks or more) for reasons connected to caring (e.g. maternity leave, adoption leave, additional paternity leave, leave to care for a dependant).

Closing date: 30 April and 31 October each year

EBI Bridging Funds for Research Fellows

This scheme is designed to support a small number of academic staff at the University of Bristol who currently hold an externally funded research fellowship. Applications accepted on a **rolling** basis.

Closing date: none

EBI Seed Fund: Public Engagement with Health Research

Seed funding is available for health researchers who would like to deliver public engagement events and activities.

Closing date: none

The Elizabeth Blackwell Institute for Health Research is officially a member of Equality, Diversity and Inclusion in Science and Health, or EDIS, an initiative set up by the Wellcome Trust, the Crick Institute and GSK. Find out more about EDIS

FUNDING OPPORTUNITIES

Would you like to receive timely, tailored funding opps information?
Do you want to know what funding opportunities come up in your research area?
Get tailored funding alerts?

Research Professional provides access to an extensive database of funding opportunities, and can send out tailored alerts based on keywords that you input, ensuring that the funding alerts you receive are the ones you want to hear about. UoB staff and students have **FREE** online access to the database from any device – once you've registered then you can view upcoming funding opportunities from home or away, not just while on the University network.

You can search for funding information by discipline, sponsor, database searches, by recent calls or by upcoming deadlines. If you register for the site and log in, you'll be able to:

- **Set up automated funding opportunity email alerts** - **tailored according to your discipline and research interests**, an easy process that will take just a few minutes to set up through the use of keywords
- **Save searches and bookmarks** - store items of interest for future reference, download and email to colleagues
- **Sign up for higher education news bulletins** – want to hear about what is going on in the broader HE environment? Latest news on the REF, setting up of UKRI etc? Sign up for the 8am playbook or the Research Fortnight news publications and stay up to date with the latest news.

Alternatively, a full calendar of funding opportunities for neuroscience research has already been set up and is available online. Subscribing to the calendar will place the entries in your own calendar, which will automatically update according to pre-specified search criteria. Find out more about **Research Professional** on the RED website. Note that some calls may have an internal process; do always remember to check the major bids webpage here to see if there is an internal process.

The following listings represent a *brief selection* of available funding for the Bristol Neuroscience community. **Full listings of opportunities** are sent out via Faculty Research Directors and/or School Research Directors, and **are available on the Research Development website**.

Research Professional

Michael J Fox Foundation for Parkinson's Research
Aligning science across Parkinson's collaborative research network

Closing date: 08-Jan-20 Award amount: USD $9M

This supports multidisciplinary research to address key knowledge gaps in the basic mechanisms that contribute to Parkinson's development and progression. Projects must focus on one of the following themes: biology of Parkinson's disease-associated genetics; neuro-immune interactions.

Dunhill Medical Trust
Research project grants

Closing date: 10-Jan-20 Award amount: £30,000

These support research projects that are important to understanding the mechanisms of ageing, treating disease and frailty and identifying and developing new and effective ways to improve the lives of older people. The grants also support research into treating diseases and conditions that disproportionately affect older people but are less well-funded. Topics include behavioural research; clinical and applied research; health services research amongst others.

Medical Research Council
New investigator research grant – neurosciences and mental health

Closing date: 22-Jan-20 Award amount: unspecified

This supports researchers who are capable of becoming independent principal investigators and who are ready to take the next step towards that goal within neurosciences and mental health.

Alzheimer's Research UK
Major project grants

Closing date: 22-Jan-20 Award amount: £500,000

These support research projects on Alzheimer's disease and related dementias. Clinical trials and drug discovery and development are not covered.

National Institute on Drug Abuse, USA
Basic mechanisms of brain development mediating substance use and dependence (R01)

Closing date: 05-Feb-20 Award amount: USD unspecified

This supports applications from investigators that propose to study the developing brain or brain areas that play significant roles in mediating emotional and motivated behaviour and in substance use and dependence. All stages of brain development are of interest, but a new emphasis of this initiative is to support basic neuroscience research on fundamental mechanisms of brain development during prepuberty and the adolescent period in relation to the problems of substance abuse and co-morbidity with psychiatric disorders.

British Neuropathological Society
Small grant scheme

Closing date: 01-Mar-20 Award amount: £5,000

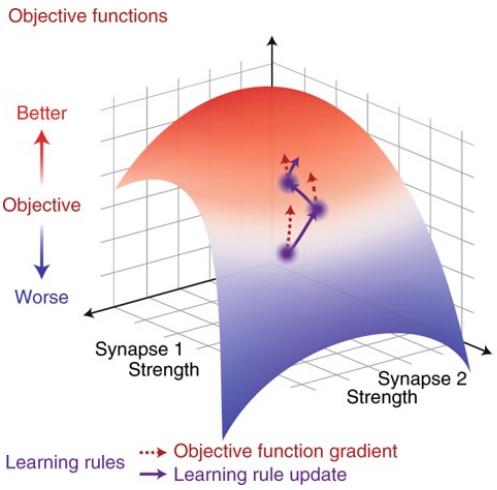
This aims to advance neuropathology by supporting both substantive and pilot projects, and projects related to education and training in the field of neuropathology. Applicants or principal investigators must be members of the society. Preference is given to early-career researchers, but applicants at later stages in their careers may be considered.

SHOWCASED ARTICLE

A deep learning framework for neuroscience

Richards BA, Lillicrap TP, Beaudoin P, Bengio Y, Bogacz R, Christensen A, Clopath C, Costa RP et al.
(2019). *Nature Neuroscience*. 22, pp1761–1770.

Systems neuroscience seeks explanations for how the brain implements a wide variety of perceptual, cognitive and motor tasks. Conversely, artificial intelligence attempts to design computational systems based on the tasks they will have to solve. In artificial neural networks, the three components specified by design are the objective functions, the learning rules and the architectures. With the growing success of deep learning, which utilises brain-inspired architectures, these three designed components have increasingly become central to how we model, engineer and optimize complex artificial learning systems. Here we argue that a greater focus on these components would also benefit systems neuroscience. We give examples of how this optimisation-based framework can drive theoretical and experimental progress in neuroscience. We contend that this principled perspective on systems neuroscience will help to generate more rapid progress.



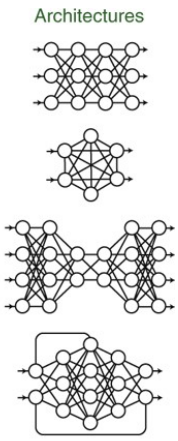


Image left: When designing ANNs, researchers do not craft the specific computations performed by the network. Instead they specify these three components. Objective functions quantify the performance of the network on a task, and learning involves finding synaptic weights that maximize or minimize the objective function. (Often, these are referred to as 'loss' or 'cost' functions.) Learning rules provide a recipe for updating the synaptic weights. This can lead to ascent of the objective, even if the explicit gradient of the objective function isn't followed. Architectures specify the arrangement of units in the network and determine the flow of information, as well as the computations that are or are not possible for the network to learn.

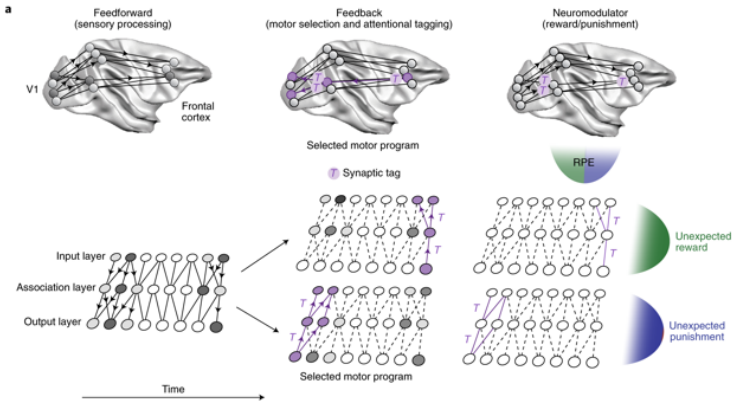


Image right: Attention-based models of credit assignment propose that the credit assignment problem is solved by the brain using attention and neuromodulatory signals. According to these models, sensory processing is largely feedforward in early stages, then feedback 'tags' neurons and synapses for credit, and reward prediction errors (RPE) determine the direction of plastic changes. This is illustrated at the bottom, where circles indicate neurons and the gray tone indicates their level of activity. These models predict that the neurons responsible for activating a particular output unit will be tagged (T) by attentional feedback. Then, if a positive RPE is received, the synapses should potentiate. In contrast, if a negative RPE is received, the synapses should depress. This provides an estimate of a gradient for a category-based objective function. b–d, Dendritic models of credit assignment propose that gradient signals are carried by 'dendritic error' (δ) signals in the apical dendrites of pyramidal neurons.

CONTACTS

Bristol Neuroscience

Director: Matt Jones, Professorial Research Fellow in Neuroscience

Memory Hub Leader: Jack Mellor, Professor in Neuroscience
Area of research - synaptic plasticity and its role in learning and memory

Movement Hub Leader: Jeremy Burn, Senior Lecturer Dynamics and Control
Area of research - modelling, simulation and control of civil, mechanical and aerospace engineering systems

Sleep Hub Leader: Matt Jones (interim), Professorial Research Fellow in Neuroscience
Area of research - neuronal networks in cognition and disease

Mental Health Hub Leader: in progress

Network Facilitator: Jacqui Oakley (Research Development)

Network Administrator: Catherine Brown (Elizabeth Blackwell Institute)

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