

# RESEARCH FORUM

The magazine for Oxford Brookes research | Winter 2017/18



## Protecting our pollinators

The search for improved insecticides



# Contents

*Research Forum*, the research magazine of Oxford Brookes University, is published twice a year.

Contributions are welcome from all sections of the University and should be sent to [researchforum@brookes.ac.uk](mailto:researchforum@brookes.ac.uk)

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Edited, designed and published by the Communications Team at Oxford Brookes University.

All articles are correct at time of going to press.

This issue and back copies of *Research Forum* are available at [brookes.ac.uk/research](http://brookes.ac.uk/research)



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**"We lead with new research to improve insecticides by making them better at targeting and selecting pests, but also safer to the environment and our valuable pollinators."**

## Hello & welcome...

...to the Winter 2017/18 edition of *Research Forum*, the magazine showcasing research excellence at Oxford Brookes University.

In this edition we feature four recipients of the Research Excellence Awards 2017/18, finding out how the funding is enhancing their research projects. The Awards were launched in 2016 as part of our commitment to supporting research-active academics.

We lead with new research to improve insecticides by making them better at targeting and selecting pests, but also safer to the environment and our valuable pollinators. This work involves testing natural plant extracts to identify insecticidal compounds and is part of an international collaboration.

There are also two research projects based around digital technology; one trialling new forms of wearable technology such as Augmented Reality to advance learning in the workplace, and the other using Shakespeare's plays to explain an emerging, modern-day issue of differentiating between real life and digital personas.

On page 10, read about how we're tackling mental health problems in the workplace through a research project based on positive goal setting. At the start of the year the government announced a strategy to transform mental health support and in a report, *Thriving At Work*, commissioned by the Prime Minister, it estimated 300,000 people leave their jobs each year because of mental health issues.

On page 8 there is more about our involvement in Oxford's first ever European Researchers' Night the 'Curiosity Carnival' held in October and our new Public Engagement Network launching early 2018.

I hope that you enjoy reading this edition of *Research Forum*. As always we welcome your comments and suggestions, so please get in touch via [researchforum@brookes.ac.uk](mailto:researchforum@brookes.ac.uk)

**PROFESSOR LINDA KING**  
*Pro Vice-Chancellor,  
Research and Global Partnerships*

# RESEARCH NEWS

## Record year for grant awards and IP income

Oxford Brookes University achieved a **record year** for research grants awarded in 2016/17.

An increase of

# 63%

compared to last year

The university also achieved

# £3.42m

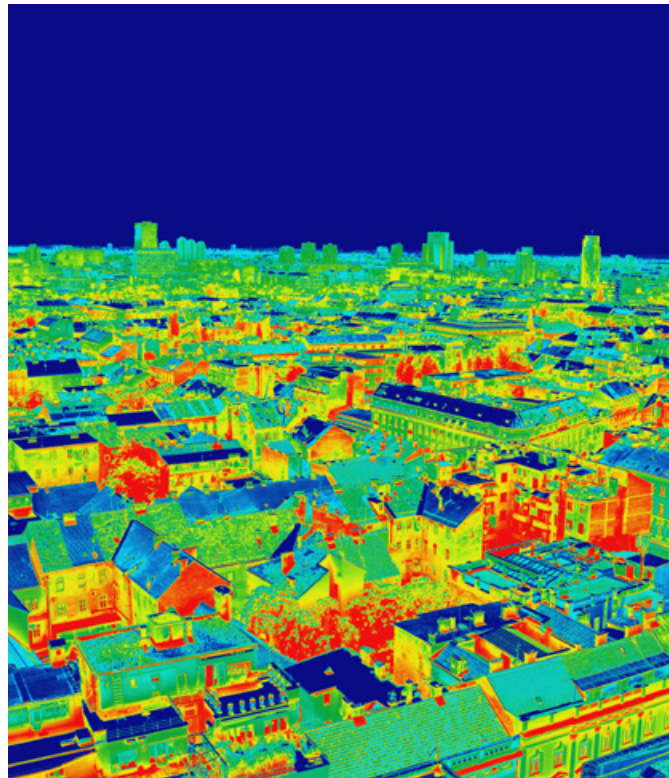
income from intellectual property (IP) in 2016/17

We've been in the

# top 10

of all UK Higher Education Institutions (HEIs) for IP income for the last 7 years\*

\*since 2009/10



## Researchers receive major grant to improve energy efficiency of homes in India

A research team led by Professor Rajat Gupta at Oxford Brookes has secured a £1.5m research grant to help support the improvement of living conditions for millions of citizens in India.

The project, entitled *Residential building energy demand reduction in India (RESIDE)*, aims to establish an empirical knowledge base to develop a residential building energy code for high-quality, low-energy housing across all five climatic zones in India.

It has been funded by the UK's Engineering and Physical Sciences Research Council (EPSRC), the Economic and Social Research Council (ESRC) and the Government of India's Department of Science and Technology (DST).

## The Harry Potter effect on the Indonesian owl trade

Researchers have investigated whether there is a 'Harry Potter effect' on owl keeping in countries where keeping wild birds as pets is considered commonplace.

In the study, Professors Vincent Nijman and Anna Nekaris turned their attention to Indonesia, where a wide range of species can be bought at bird markets in most major cities. By comparing market survey data from 1979 to 2016, which includes the period before and after the release of the Harry Potter novels, the researchers were able to show that there has been an increase in the owl trade.

Furthermore, they highlighted that where owls used to be called 'Burung hantu' (which translates as 'ghost birds'), now they are referred to as 'Burung Harry Potter', or 'Harry Potter birds'.



### 12,000 scops owls and over 1,000 other owls are sold in Indonesia's bird markets each year

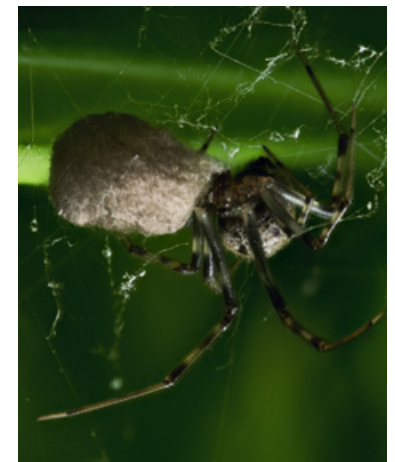
(Survey of 20 bird markets in Java & Bali 2012-2016)

## Ground-breaking research on gender diversity in horseracing

The first ever research into diversity in British horseracing was published by the Centre for Diversity Policy Research and Practice (CDPRP) at Oxford Brookes University and Women in Racing. The research demonstrates the requirements to develop a gender diversity agenda within the sport.

Recommendations include establishing an independent diversity steering body to support British horseracing in developing a deeper understanding of its diversity.

Professor Simonetta Manfredi, Associate Dean for Research and Knowledge Exchange in the Business School and Director of the CDPRP undertook this research with PhD Researcher Kate Clayton-Hathway.



### Rare whole genome duplication during spider evolution could reveal more about animal diversification

A team of scientists, including Professor of Evolutionary Developmental Biology Alistair McGregor, have discovered a rare and ancient genomic change during the evolution of spiders and scorpions that could help us to understand more about the evolution of animals, including humans.

Analysis of the genome of the house spider has revealed that spiders and scorpions evolved from an ancestor, over 400 million years ago, which made new copies of all of the genes in its genome – a process called whole genome duplication.

The new finding of a whole genome duplication in spiders and scorpions provides a valuable comparison to the events in vertebrates and could help reveal genes and processes that have been important to our own evolution.

## Study identifies hominin species that gave ancestors genital herpes

A team of scientists from Oxford Brookes University and the University of Cambridge have identified the species believed to have contracted and passed on genital herpes (HSV2) to early humans.

In a study published in the journal of *Virus Evolution*, they suggest that *Parathropus boisei* – a heavyset bipedal hominin with a smallish brain and dish-like face – most likely contracted HSV2 through scavenging ancestral chimp meat where savannah met forest – the infection seeping in via bites and open sores. Hominins with HSV1 (cold sores) may have been initially protected from HSV2, which also occupied the mouth, until HSV2 adapted to a “different mucosal niche” located in the genitals.

This ground-breaking research has reconstructed an event that happened in the life of one of our ancestors millions of years ago that is otherwise invisible to traditional archaeological approaches.



## Children in Swedish gender-neutral preschools less likely to form stereotypes

A study by Dr Ben Kenward, Senior Lecturer in Psychology, has found that children attending gender-neutral preschools in Sweden are less likely to form stereotypes about gender than those in traditional preschools.

The study compared children at a preschool with pedagogical practices which de-emphasize gender differences, to those attending other preschools in Sweden. It found that children at the gender-neutral school scored lower on a gender stereotyping measure. They were also more willing to play with unfamiliar other-gender children. The work demonstrates that these previously un-investigated pedagogical practices have meaningful effects.

## cycle BOOM researchers win top national research award

The cycle BOOM team of researchers were named the winners of the Academic Award category at the 2017 Royal Town Planning Institute's (RTPI) Awards for Research Excellence.

The cycle BOOM project was a three-year study led by Oxford Brookes University and set out to investigate how older people in the UK experience cycling and how this affects independence, health and wellbeing.

The Awards for Research Excellence recognise and promote high-quality, impactful spatial planning research from RTPI accredited planning schools and planning consultancies around the world.

## New Vice-Chancellor Fellowships at Oxford Brookes

The University has further demonstrated its strong commitment to investing in high-quality research by launching new Vice-Chancellor Fellowships. Offering an excellent opportunity for researchers who want to develop their careers, the Fellows have been appointed across all faculties to help build on their research strengths. For each post there is start up support tailored to discipline needs. The posts also come with funding for areas such as supporting travel and conference attendance.

### WHO THEY ARE:

#### OXFORD BROOKES BUSINESS SCHOOL

**Dr Hossein Olya** – Centre for International Tourism and Events Management

#### FACULTY OF HUMANITIES AND SOCIAL SCIENCES

**Dr Sally Holloway** - Department of History, Philosophy and Culture

**Dr Maria Christou** - Department of English and Modern Languages

#### FACULTY OF TECHNOLOGY, DESIGN AND ENVIRONMENT

**Dr Paul Henshall** – School of Architecture

**TBC** – School of Engineering, Computing and Mathematics

#### FACULTY OF HEALTH AND LIFE SCIENCES

**Dr Verena Kriechbaumer** – Department of Biological and Medical Sciences

**Dr Olga Kozłowska** – Oxford Institute of Nursing, Midwifery and Allied Health Research (OxINMAHR)



## New research investigates law enforcement scenario planning for security threats

Juliette Koning, Professor in Organisational Studies at Oxford Brookes Business School, with Professor Math Noortmann at Coventry University, have launched a study entitled *Imaginative Scenario Planning for Law Enforcement Organisations*. The project, in collaboration with scholars from Utrecht University in the Netherlands, will investigate how law enforcement organisations in the UK and the Netherlands understand the policies of, and strategic planning for, future security threats.

The project is one of eight announced by the Centre for Research and Evidence on Security Threats (CREST) to address some of the security threats facing the UK.

## UK cuts to public spending is 'one of the longest in a century'

Research by Dr Rozana Himaz, Senior Lecturer in Economics, has highlighted a striking historical comparison of the change in the length and depth of cuts to public spending over the past 100 years.

In collaboration with Professor Christopher Hood, from the University of Oxford, this research is the subject of a book, *A Century of Fiscal Squeeze Politics*, published earlier this year.

Their research identifies a long-term shift from what they term a 'surgery without anaesthetics' approach (deep, but short-lived episodes of spending restraint or tax increases) in the earlier part of the period towards a 'boiling frogs' approach (episodes in which the pain is spread out over a longer period) seen in more recent decades.

# Researchers inspire at Oxford's Curiosity Carnival

On 29 September 2017 Oxford joined hundreds of other European cities simultaneously in celebrating European Researchers' Night.

The initiative is a Europe-wide event dedicated to explaining research through fun, interactive learning and 'Curiosity Carnival' was the first one ever to be held in Oxford, attracting over 10,000 visitors.

Led by the University of Oxford working together with Oxford Brookes University and MRC Harwell, the carnival featured a huge variety of free activities and events for all ages at multiple locations across the city including the Oxford Museum of Natural History, the Ashmolean Museum and the Botanic Garden.

Dr Anne Osterrieder, Senior Lecturer in Biology and Science Communication was part of the organising team co-ordinating Oxford Brookes' involvement.

"We are very grateful to everyone who helped make the event such a big success. We know how much thinking, preparation and energy goes into running a public engagement activity.

"Myself and colleagues managed to drop by each of our researchers' activities on the night and there was such a buzz and excitement from the visitors, and passion and enthusiasm from the volunteers."

## Over 30 researchers from across Oxford Brookes took part in activities across every venue on the night, including:

- Researchers from the School of Architecture showcased the importance of space planning and design
- Lecturers from the Department of Computing and Communication Technologies and the Department of Nursing demonstrated an EU funded project where they are developing an app to help people with type 1 diabetes self-manage their condition
- Researchers from Oxford Brookes Business School engaged visitors in their research to address food shortages with edible insects and ways people may overcome inhibitions about eating them.



## Hear from some of the participants:

Patrick Alexander, Senior Lecturer, Education (Anthropology & Sociology):

"It was a fantastic opportunity to share my research on imagined futures with a wider audience. My installation combined visual representations of research data with a soundscape, combining original musical composition with live performance and excerpts from interviews that I've carried out with young people over the last three years."

Peta Lloyd, Aha! Performing Art Research, Contemporary Arts ReSearch Unit (CARU):

"Curiosity Carnival was a good opportunity to try out work in front of the general public, gauge their reactions to a range of performances and respond to their questions and comments."

Janine Dermody, Professor in Marketing and Consumer Psychology:

"It was incredibly hard work but an amazing experience for our 'edible insects tea party' and 'cafe speed dating'. We took away a lot from the event about further ways we can engage the public in what we are doing."

Research assistants from the Centre for Movement, Occupational and Rehabilitation Sciences (MORES) at Brookes:

"It was great fun, it was good to see the children excited about the different tests and interested in what we do, a great atmosphere and full of people who wanted to learn."

"I haven't done anything like this before and am looking forward to getting involved in more public engagement."

## The new Public Engagement Network (PEN)

In early 2018 Oxford Brookes will be officially launching a new PEN. It will bring together researchers interested in public engagement and help support and promote their activities.

The new PEN at Oxford Brookes will be the first point of contact for public engagement advice, providing training and resources, information on various engagement opportunities and events, as well as improving collaboration and showcasing excellence in public engagement.

February 2018 will see the University celebrate ten years of the Brookes Science Bazaar, one of its key public engagement events. The full day of science fun is aimed at families with children from 4-12 years, with lots of hands-on activities designed and run by staff and students.

Visit the website for more information

[www.hls.brookes.ac.uk/brookes-science-bazaar](http://www.hls.brookes.ac.uk/brookes-science-bazaar)





# Wellbeing in the workplace

**One in four adults will be diagnosed with a mental health illness at some point in their lives. Research by Dr Christian Ehrlich, Senior Lecturer at Oxford Brookes Business School, is exploring the challenges this can lead to in the workplace and how they might be reduced through goal-setting.**

**I**n a recent report from the World Health Organization it suggests that deteriorating mental health could be one of the most serious health challenges of the 20th century to Western society.

This is significant for employers, as factors such as heavy workload and professional burnout contribute towards the deterioration of mental health in employees. This is an important issue and why I have dedicated a lot of time researching into wellbeing in the workplace.

Most recently I have been exploring how goal setting at work can have a very real impact upon an individual's mental health, providing a sense of structure and achievement for many. What is crucial to my research, is understanding how the motivations behind goal setting impacts on wellbeing.

We all pursue different goals, for different reasons. Those of us who set ourselves goals because we genuinely enjoy working on a particular task, are likely to report

a high level of happiness. This is also true of people who believe their work helps others in some way, like a counsellor or nurse. Initial research shows those who underpin daily activities with positive goal setting are also more likely to be engaged at work than those who do not.

I believe that doing things for the right reason is an important human challenge, however my research shows that people quite frequently pursue their goals for reasons that are less happiness

enhancing. Pursuing goals for the wrong reasons can affect emotional wellbeing. People who set themselves tasks because they feel they have no other option than to, report a much lower level of happiness. Some of us subscribe to work tasks because of the financial incentive, they may take on too much work out of the necessity to earn money. Others might set themselves work goals purely for egotistical reasons and value praise on a task over the real want to complete it. It is these groups who report higher levels of burnout.

Then there are those of us who fixate on completing goals, without questioning why we have set ourselves that particular goal in the first place. There is substantial research which shows that the 'why' of goal-pursuit matters, at times even more so than the actual goal itself.

Fortunately, I have been given the ability to develop my research

through the University's Research Excellence Awards, which will allow me to explore motivations of workers in more detail, asking the question: Why do those who pursue their goals for well-being enhancing reasons report being happier in life than those who pursue goals for negative reasons?

I am now in the position to develop my model further by exploring other important goal-setting reasons, such as how we engage in activities because we know they have positive consequences and, contrastingly, how we avoid actions when we know they would have negative consequences. The data from the initial investigation shows that an understanding of the motivations behind activity pursuing can increase the prediction of important, mental health related, outcomes such as burnout levels and levels of work engagement.

I will also be expanding the

scope of my research by looking at whether the selfless actions of people in the voluntary sector equates to positive well-being. Interestingly, my initial research has concluded that charitable reasons are often not the main reason why people are drawn to voluntary work. I want to explore why this is.

Finally, I will be developing a training programme to help employees analyse and rethink their own motivations for their goal pursuits. This programme, off the back of a catalogue of research, will be given a validity and uniqueness in demonstrating how research can contribute to our happiness and wellbeing at work.

For more information about research in the Business School visit  
[www.brookes.ac.uk/business/research](http://www.brookes.ac.uk/business/research)

# Protecting our pollinators

Through new research testing natural plant extracts, **Dr Andrew Jones**, Senior Lecturer in Molecular Biology and Genomics, is aiming to identify compounds that could lead to the development of insecticides which better target pests and are safer to the environment and our bees.

In 2013 the European Union implemented a moratorium on the use of neonicotinoid insecticides on treated crops amidst fears that these insecticides were causing, at least in part, the alarming decline of honey bee numbers.

Bees are important as their pollinating activities contribute to the production of 75% of crop species, a service that is estimated to be worth over US\$200 billion annually worldwide.

Initially it was envisaged that the moratorium would be a temporary one, but now there is a debate on whether the ban should be permanent.

With the use of neonicotinoids being restricted, crop protection fell back to the reliance on an older class of insecticides, the pyrethroids. With pests showing resistance to pyrethroids, farmers were spraying crops with these insecticides up to five times a year rather than just the normal one or two, raising concerns that there was increased harm to the environment.

Pyrethroids are also used to control mosquitoes that spread major diseases such as malaria and dengue fever. However, mosquitoes too are becoming resistant to these insecticides.

All of this highlights how reliant we are on only a small number

of compounds to protect our crops or to prevent the spread of insect-borne diseases. We need to develop novel ways to control insect pests, an example being improved insecticides that spare non-target organisms such as bees and other pollinators.

Over the past 20 years I have been studying a group of receptors, known as cys-loop ligand-gated ion channels (cysLGICs), which are important for sending signals around the nervous system. CysLGICs include nicotinic acetylcholine receptors (nAChRs) and GABA receptors, which are well established targets for effective insecticides. >



Neonicotinoids, and another insecticide, fipronil (which was also banned by the EU for the same reason as for neonicotinoids), activate or block nAChRs and GABA receptors, leading to unnatural signalling in the nervous system and death for the insect.

My studies of cysLGICs from diverse insects including *Anopheles gambiae* (mosquito that spreads malaria), *Acyrtosiphon pisum* (pea aphid that damages crops) and *Apis mellifera* (honey bee that pollinates crops), have highlighted that there are differences between the species so their nAChRs or GABA receptors may respond differently to insecticides.

This raises a question which is central to a major avenue of my research: Can these differences be exploited to develop compounds that specifically act on the cysLGICs of an insect pest rather than a pollinator?

My Research Excellence Award will allow me to establish an international collaboration

with Luis Aguayo, Professor of Pharmacology at Universidad de Concepción, Chile.

Professor Aguayo has purified natural toxins and compounds from plants that act on GABA receptors. Whilst his work is focussed on using the toxins as tools to study human receptors, the Award will fund a postdoctoral researcher at Oxford Brookes University to determine whether the plant extracts also act on GABA receptors of different insects (mosquito, aphid and honey bee) as well as from human.

Crucially, because we are using GABA receptors from several species, we can measure whether the compounds show greater potency on insect versus mammalian GABA receptors and whether there is varying potency amongst the different insect species.

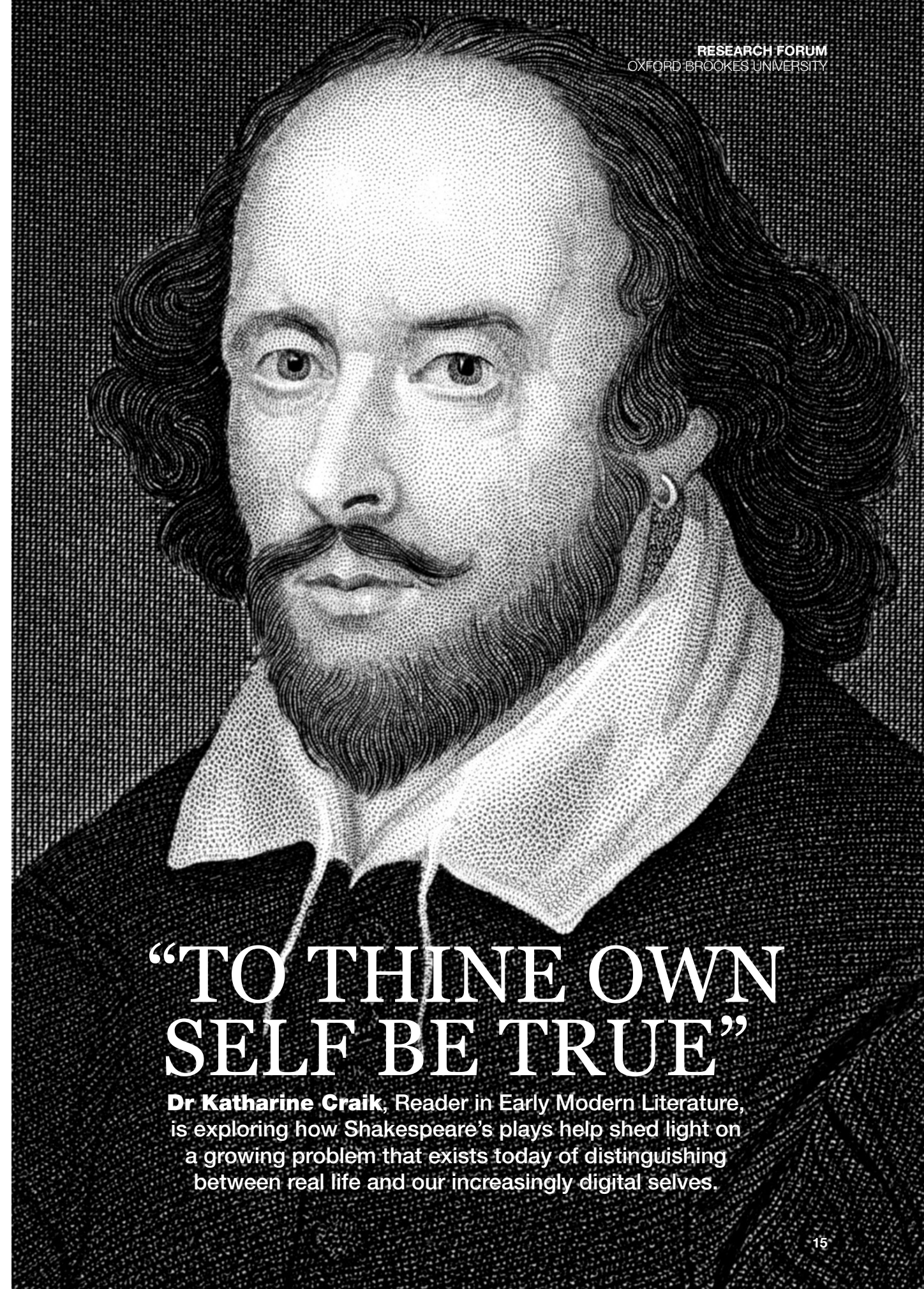
Through our research we aim to identify novel compounds with insecticidal activity that is

potentially less toxic to mammals. This will have an immediate impact, and the impact will be greater still if we also find that any of the compounds tested show higher potency on GABA receptors of either the mosquito or aphid than on the honey bee receptor.

As we are testing natural plant extracts, any potential insecticidal compounds we have identified are essentially biopesticides, which will be biodegradable and safer to the environment than synthetic chemicals. This research, therefore, will provide an exciting first step in the search for improved insecticides that are selective for pest species.



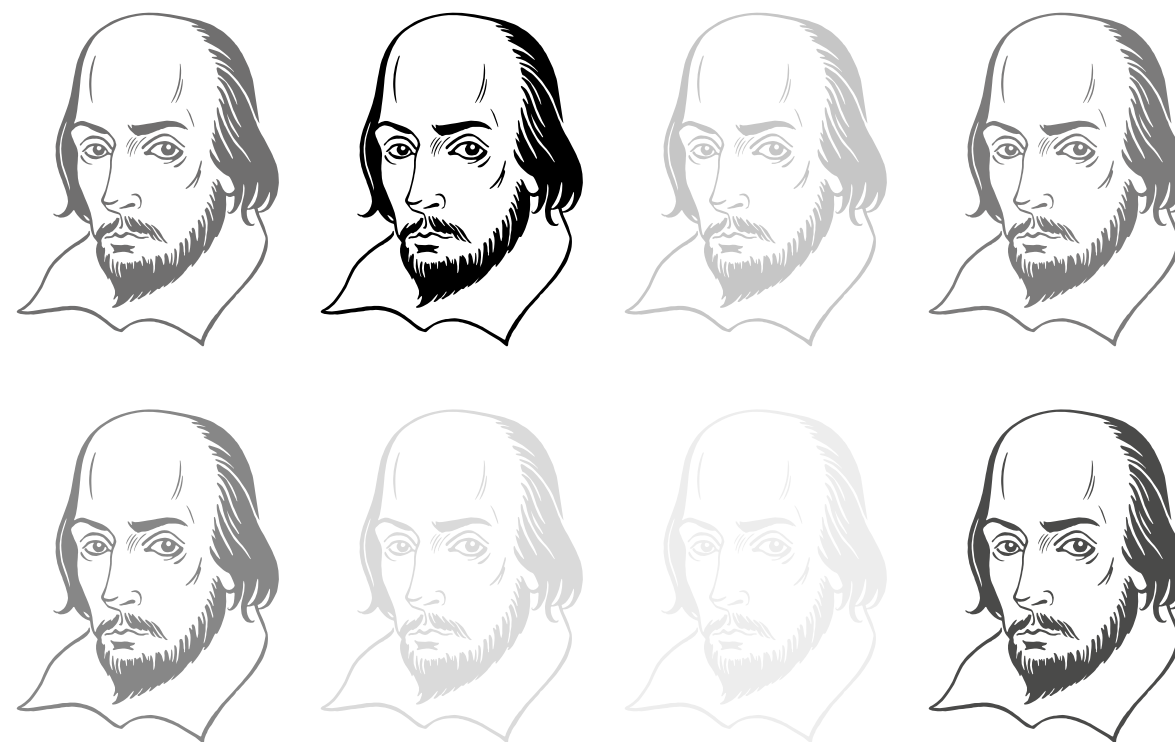
For more information about research in the Department of Biological and Medical Sciences visit [www.brookes.ac.uk/bms/research/](http://www.brookes.ac.uk/bms/research/)



“TO THINE OWN  
SELF BE TRUE”

**Dr Katharine Craik**, Reader in Early Modern Literature, is exploring how Shakespeare’s plays help shed light on a growing problem that exists today of distinguishing between real life and our increasingly digital selves.





We knew who we were 20 years ago. We had not yet created digital versions of ourselves using Facebook, Twitter or Instagram. We had not yet developed our 'email persona', and we could not yet catapult ourselves into the hands of others using Skype or FaceTime. Internet gaming was still in its infancy and could not yet offer us glamorous or ruthless avatars capable of succeeding where we habitually fail.

All of these technologies allow us to experience ourselves through the eyes of others and to curate parallel identities which are distinct from – although intimately related to – everyday existence.

At the same time, our newly networked lives allow us to interact regularly and meaningfully with people who are not physically close to us; or with people who have never and will never exist.

Our sense of who is really there – on our screens, in our houses,

in our lives – is less stable than ever before. Real life has become startlingly proximate to life-like representation, and both physical and virtual reality now seem more or less inseparable.

Go back over 450 years and we find that Shakespeare and his contemporaries already had a word for the intimacy and estrangement which now characterises our networked lives: hypotyposis.

Borrowed from the ancient Greeks, this word simply means 'vividness'. The best poets and playwrights had mastered it and could make readers or audiences experience people so colourfully, urgently and realistically in their imagination that they seemed as if they were really alive.

My book of the same name – generously supported by the Research Excellence Awards from Oxford Brookes – focuses on episodes in Shakespeare's plays where absent or imagined people are summoned vividly into the lives of others: unborn children spring

into being, lost or forgotten voices are recovered and the dead are quickened.

Why does Macbeth address Banquo's ghost as his "sweet remembrancer?" What does Hamlet mean when he says he sees his dead father in his "mind's eye"? Why does the war-torn Coriolanus look so much more heroic to those who conjure him up in their minds – rather than to those who encounter him in person?

Shakespeare's plays were written centuries ago, but shed eerie light on a contemporary problem: the inseparability of real life from those we experience as digital figments – including ourselves.

Hypotyposis already posed a complex set of problems towards the end of the 16th century. At this time church ministers were debating ways to make Christ vividly apprehensible to believers through preaching and the sacraments. Using the concept of *fides ex audita*, or faith by hearing,

God was becoming present through the ear rather than the eye, allowing believers to find ways around the post-Reformation denunciation of images and symbols.

At the same time as print technology and illustration became increasingly sophisticated, people were debating the merits of book-learning as opposed to the direct, sensory experience of the world. Across early modern culture in theology, science and philosophy vivid representation was becoming closer and closer to 'the truth'. And Shakespeare turned the early modern playhouse into a crucible for exploring this rapidly developing tension.

The ethical questions hypotyposis raises also issue a direct challenge to the present. The technology originally developed to help us understand the world has more recently become sociable, affective and relational so that we feel rather than think with our digital devices. In particular, we now interact with digital personae in

much the same way as we interact with others in the world. Life-like people emerge as preferable, in many ways, to the complexity, frustration and everyday humiliation of real-life relationship.

But what are the opportunities and risks involved in summoning up and immersing oneself in life-like others – particularly when their presence is so difficult to distinguish from one's own?

The final chapter of my book considers what light Shakespeare's *Hamlet* sheds on the human conundrums posed by novel technology. To what extent can our memories, identities or lives be archived, contained and possessed by others?

For more information about research in the Department of English and Modern Languages visit [www.brookes.ac.uk/english-languages/research](http://www.brookes.ac.uk/english-languages/research)

**The technology originally developed to help us understand the world has more recently become sociable, affective and relational so that we feel rather than think with our digital devices.**

# Transforming workplace training with the latest AR technology

**Dr Fridolin Wild**, Senior Research Fellow in the School of Engineering, Computing and Mathematics, has been trialling how wearable technology, such as Augmented Reality (AR), can be used in the workplace to enhance practical learning; trials so far have included aircraft engineers, trainee doctors and even astronauts.

**W**e are hearing more and more about radical new developments in technology, from smartphones to smart glasses. Although advancements in technology are generally acknowledged as making positive contributions to society, progress causes change which can lead to uncertainty.

Many people are wary of the increase of cutting-edge technology in the workplace and often pose the question: Is it possible that a robot will take my job? An understandable concern for workers, but the use of robotics and other advanced automation technology within organisations can actually help staff to complete their work more efficiently, cut the time spent on especially repetitive, uncreative tasks and even allow them the opportunity to develop skills.

Today, only 9% of all tasks undertaken by workers are able to be completed fully by automation. A relatively small amount, so even if we began increasing automation for these certain roles, people shouldn't feel the need to fear for their jobs.

Already in the workplace, new technologies help employees to upskill, through learning how to programme and operate the machines doing the jobs they were initially doing. This will help employability and productivity, in a way that is engaging and empowering.

My research within Wearable Experience for Knowledge Intensive

Training (WEKIT) seeks to close the dissociative gap between theoretical knowledge of a subject and its practical application. I explore radical new forms of linking directly from knowing something 'in principle' to applying that knowledge 'in practice' by taking advantage of new forms of wearable technology and technology – enhanced learning, especially Augmented Reality (AR).

AR is a technology which has enhanced real life experiences by the addition of computer-generated virtual components in order to improve the intractability, for example using graphics or animations. AR technologies change what people see and feel, so at times it can become indistinguishable from reality.

I have been trialling how AR technology can be used as a medium for learning in the workplace, to change the experience of a practice work scenario, so that a trainee expands their learning practices from just reading or watching a video. The trials included tests with aircraft maintenance engineers, astronaut trainers and doctors in training.

One upcoming project includes collaboration with BMW, using AR holographic glasses to evaluate how to support workers in training novel assembly procedures. The simulations used to practice will be much more realistic and a better way of training than just using hand-outs. Using AR in training can be assumed to lead to better sensory-semantic and episodic memories in

those who use it and the ability to understand teachings much faster, which leads to increased confidence in a skill.

Currently 1 in 4 jobs in the UK are unfilled due to a lack of candidates with appropriate qualification or experience. Training opportunities that incorporate AR might just be the way to fix skills gaps in some industries. It also has the potential to have a positive impact on the time and costs of training large numbers of people.

With opportunities come new obligations. The use of AR in workplaces as well as in private homes calls for new models for privacy and data protection, ergonomics and inclusiveness to name but a few. Standards need to be developed in order to guide the adoption of new technology enhanced learning devices.

AR is gaining traction across the globe, but it is not only about the technology. If we want to get it right, we have to study novel means of human computer interaction more closely as well as assess more clearly the impact of the technology on work, leisure and society as such. In my lab we are trying to do just that.


For more information about research in the School of Engineering, Computing and Mathematics visit [www.brookes.ac.uk/ecm/research](http://www.brookes.ac.uk/ecm/research)



ISS Shuttle, WEKIT consortium, Carlo Vizzi



WEKIT consortium, Biebeg Limbu

 This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 687669.

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