

AUTUMN/WINTER 2025

RSE *The Royal Society
of Edinburgh*
KNOWLEDGE MADE USEFUL

ReSource

THE MAGAZINE OF SCOTLAND'S NATIONAL ACADEMY

A portrait of Dr Alicia Greated, a woman with shoulder-length blonde hair, smiling. She is wearing a black V-neck top and a pink and red patterned scarf. Her hands are clasped in front of her, resting on a dark wooden railing. The background is a blurred outdoor scene with trees and a building.

A CALL TO ACTION

CaSE Executive Director Dr Alicia Greated on the importance
of public opinion of research and development

ALSO IN THIS ISSUE:

RSE Medal winners | *Curious* Festival | Election programme | Tertiary Education Funding Conference

KNOWLEDGE MADE USEFUL

Education conference to discuss future held at pivotal moment

The variety of potential future funding models for tertiary education in Scotland was the focus of a conference held at the RSE in May.

The event, led by RSE Fellows Sir Andrew Cubie and Professor Alice Brown, brought together a wide range of voices, including students, academics, sector leaders, employer representatives, and policymakers, for a timely and informed discussion on the future sustainability of Scotland's colleges, universities, and private training providers.

What emerged was a clear picture of a sector facing real and urgent financial pressures. Institutions, students, and staff are navigating a challenging landscape marked by funding constraints, growing maintenance backlogs, international competition, and demographic shifts. There are major risks facing the sustainability of individual institutions, which could have serious repercussions on the rest of the tertiary system.

At the same time, there is collective recognition of the essential contribution that tertiary education makes to Scotland's economy, society, and global reputation.

The conference involved some of the top UK and international experts in the funding of post-school education. The financial crisis facing the further and higher education sectors is not unique to Scotland. A number of experts highlighted similar pressures in the other UK nations and internationally.

This event underscored the importance of drawing on both UK and international experience and cross-sector insights to inform the debate. It also highlighted

the power of evidence in shaping effective and equitable approaches, including from students themselves.

The RSE is committed to providing a platform for trusted, independent ideas and evidence, helping to ensure that decisions on the future of tertiary education in Scotland are grounded in robust understanding and shared knowledge.

As we will highlight in our work going forward, our education sector is key to Scotland's future success. Hence, this is not the end of the dialogue but rather the continuation of a sustained effort to inform policy and practice through thoughtful, impartial engagement.

As part of our work in the run-up to the Scottish elections in 2026 we intend to continue to feature the key policy debates in this important area. It is crucial that all political parties realise the importance of the tertiary sector to Scotland's future and the RSE stands ready to facilitate and convene key debates on this issue.

RSE President Sir Anton Muscatelli said: "We are deeply grateful to all who made this important conference possible.

In particular, we would like to thank Sir Andrew and Professor Brown for their expert guidance and leadership in organising the event.

"We also acknowledge the vital institutional support provided by the University of Edinburgh, Edinburgh College and Robert Gordon University. Finally, our sincere thanks go to William Hardie and Lauren Harrison, whose dedicated efforts were instrumental in bringing the conference together."

Read more about the conference at bit.ly/tertiary-education-funding

Welcome to the Autumn/Winter 2025 issue of *ReSourceE*. This issue focuses broadly on the variety of ways that humans communicate with one another.

Communication has never been easier, more frequent, more rapid, and more ubiquitous than at this moment in human history. We even find ourselves in the midst of an artificial intelligence boom that means non-human to non-human communication will only increase.

Yet it does appear that the gulf between factions – political, national, international, even personal – has never been so vast. This is despite the capacity to communicate instantaneously with people half the world away, and the ever-expanding ability to translate from one language to another. Despite these fractures, I would argue that there is still far more that we have in common than divides us, so why is it that the more we seem to say, the less we seem to hear? It is to this idea that we turned our attention in this edition of *ReSourceE*. There is food for thought to be found in these pages, as well as much healthy optimism about the variety of different frontiers of human communication that we might take for granted.

There is also news of the 2025 cohort of winners of the range of prestigious RSE medals, which are presented to those academics who have distinguished themselves in the fields of law, physics, biology, and forensics.

As ever, we welcome your feedback and ideas for issues. Please share your thoughts by emailing comms@theRSE.org.uk

Professor Sir Anton Muscatelli PRSE

PLEASE NOTE: The opinions expressed in *ReSourceE* are those of the contributors and do not necessarily represent those of the Royal Society of Edinburgh.



ON THE COVER:
Dr Alicia Greated FRSE,
Executive Director of
Campaign for Science
and Engineering (CaSE).



From left: Sir Andrew Cubie FRSE, Dame Frances Cairncross FRSE and Professor Alice Brown FRSE © Gemma McNaughton

From strength to strength

This year's *Curious* festival was successful, serving as another way for the Society to engage with the public and showcase research and expertise.

This was the seventh festival and it continues to be a vibrant and vital space for learning and discussion.

A typically broad range of subjects was covered, offering events from deep in our past – such as the proposed repatriation of the African skull collection held at the University of Edinburgh, the history of the Scots language, and the moral cost of Allied victory during the Second World War – all the way through to representation of history in modern computer games, the cutting-edge use of ultrasound in diagnosing and rehabilitating people with swallowing disorders and a vast range in between.

Professor Martin Hendry FRSE, RSE Vice-President for Public Engagement, said:

“It is a real treat to see our *Curious* festival continue to evolve and grow.

“It was founded on curiosity – the impulse to ask questions and embrace new ideas and openness – with no gatekeeping,



working across disciplines and holding open discussions on subjects that matter.

“Ultimately, *Curious* really strives to create and maintain a bridge between high-level academic research and public engagement, to mobilise new research for the general public to either grapple with ideas, or make use of new information and research, for example, in the case of the *Your data, your story* event, which sought to give people the tools to more fully understand their own data, which is a very forward-thinking stance to take.”

Curious was attended by 1,100 people this year, of which about 350 said it was their first time attending an RSE event. The festival boasted 31 events – 10 of which were livestreamed – and two full exhibitions that were all attended by people from age 16 to 80.

The 2026 Curious programme launches in July. Stay informed on Curious and other RSE events by visiting rse.org.uk/subscribe for updates.

Election programme to spark debate

In October, the RSE launched its Scotland-wide programme of events intended to spark debate ahead of the Scottish Parliamentary election next year.

Taking place throughout November and December, the programme brings together communities, schools, experts, and local

organisations nationwide to discuss the questions that will define Scotland's next political chapter.

People across Scotland, including in Dundee, Dumfries, and Ullapool, have been invited to events covering topics from fair workplaces to navigating a world where

truth is increasingly contested. The events are designed to create spaces where people can explore evidence, hear from local voices, and exchange ideas on the challenges and practical solutions.

The activities are intended to generate new ideas for Scotland's future through constructive political conversations. The RSE will publish its own manifesto in February 2026.

The future of our secrets

In August 1977, an article appeared in *Scientific American* that changed the world. It defined the RSA public key cryptography system created by Ron Rivest, Adi Shamir and Len Adleman from MIT.

With Rivest-Shamir-Adleman (RSA), for the first time, a person – let's call her Alice – would advertise a public key to anyone and this could be used to encrypt data for her, then only the associated private key could decrypt it. Martin Gardner's article, 'A new kind of cipher that would take millions of years to break', heralded a seismic shift in cryptography.

Along with this two-key system, the method could be used to digitally sign data, and where Alice could sign the fingerprint of a message (otherwise known as a hash signature) with her private key.

It was pure magic and it is still being used to define the trustworthiness of the websites that we connect to. For me, it was my first sight of cryptography and I was captivated by the simplicity and power of the method. In essence, this system works by multiplying two large prime numbers to provide a modulus, where contemporary computers struggle to factorise the result back to the original prime numbers to decipher the key.

Something just as significant happened the year before – 1976 – that provides us with the core of security on the internet: the Diffie-Hellman method. This was invented by Whitfield Diffie and Martin Hellman at Stanford University and would allow our friend Alice to share something across a public domain with her friend, let's call him Bob, that would remain secret. No adversary – without considerable computational power – could discover the shared secret, even though they have publicly

communicated. We can then use the secret to create an encryption key, and Bob and Alice can use this key to send private information between themselves. The method used discrete logarithms – based on John Napier's logarithms but made discrete with the use of a large prime number. These days, though, we use elliptic curve methods to create the key exchange for our online connections. This is known as ECDH (Elliptic Curve Diffie-Hellman) key exchange.

So, after several decades, we have used the methods of RSA and ECDSA (Elliptic Curve Digital Signature Algorithm) to create our digital signatures and ECDH to create our key exchange methods for our online connections.

But all of this will change with the advent of quantum computing. For this, computer scientist Peter Shor showed how our existing public key cryptographic methods could be broken in a matter of days or even hours using a quantum computer built at scale.

This will mean that the foundation of the security of the internet will have to replace its existing public key methods with methods that are quantum-robust.

Luckily, the National Institute of Standards and Technology (NIST) – the US standards agency – has been working on finding new methods which are quantum-robust. For this, we have new methods of Module-Lattice Key Encapsulation Mechanism (ML-KEM) to replace ECDH and Module-Lattice Digital Signature Algorithm (ML-DSA) and Stateless Hash Digital Signature Algorithm (SLH-DSA) to replace our digital signature methods. As there will be a good deal of change within organisations for this migration, it is likely that we will run both our classic methods and post-quantum methods together for a while – known as a hybrid approach.

Overall, NIST has defined that 2030 will be the year to switch over to quantum-robust methods for critical infrastructure domains, and 2035 for the rest. The National Cyber Security Centre (NCSC) proposes that organisations should be moving into a discovery mode for the methods that need to be migrated.

But cryptography is not just about key exchange methods and digital signatures, it brings alive a whole range of methods which provide confidentiality, assurance, and privacy.

One significant area is the rise of the usage of digital ID and digital wallets. If successful, their usage will further support the freedom of movement in the EU and harmonise government systems across country borders.

With an e-ID-derived wallet, citizens will be able to store documents related to their academic qualifications, their rights to work and so on. Within the UK and Scotland, we will also see the rise of digital ID and in the usage of digital wallets to prove the required proof of our identity and move fully away from our paper-based approaches.

But we need to guard against breaches of our privacy and this is where cryptography provides methods in being able to prove things, without actually giving away our private information. This sees the rise of Zero Knowledge Proofs (ZKPs) and where we could prove that we are over 18, without actually showing someone our age.

It is an exciting time to be in cryptography, with the rise of distributed ledger technology (DLT) and crypto assets in finance, the switch-over to quantum robust methods, and the rise of digital ID and wallets. But we must guard against a Big Brother society and build systems which respect the rights of citizens to privacy.



Professor William Buchanan

Professor William Buchanan OBE FRSE, School of Computing, Engineering and the Built Environment, Edinburgh Napier University

Counting the cost of dysphagia

– and the social benefits of treating it

Dr Joan Ma, Senior Lecturer in the Speech and Hearing Sciences Division, Queen Margaret University and RSE Personal Research Fellowship awardee in 2023



When we think about communication, we are mostly thinking about words, conversations and stories – but meals, drinks, and food provide some of the most profound contexts where communication happens. Sharing a meal with your family after a long day at work, catching up with an old friend over coffee or marking celebrations with a birthday cake, all involve an innate function that we do between 500 and 700 times a day: swallowing. Most of us never really think about this largely reflexive and silent process until it goes wrong.

Dysphagia refers to difficulties in eating, drinking, and swallowing and is common in neurological conditions such as acute stroke and Parkinson's. Neurological conditions contribute to 10-20% of acute hospital admissions and 10% of the overall disease burden in Scotland¹.

They are recognised as a significant factor in reduced life expectancy and long-term health inequalities². Unlike other physical disabilities, dysphagia remains largely hidden. People with dysphagia sometimes do not mention it to their healthcare providers; instead, they adapt quietly. They might avoid certain foods, decline invitations to eat out, or change their social lives altogether. In addition, aspiration pneumonia, malnutrition, and dehydration are also common consequences of dysphagia.

The Swallow Vision project, established a decade ago at Queen Margaret University, aims to develop the use of ultrasound in different areas of Speech and Language Therapy, with its application in the assessment

and management of dysphagia being a priority. Ultrasound Evaluation of Swallowing (USES) offers a minimally invasive method for real-time evaluation of swallowing. This application utilises a portable, pocket-sized ultrasound system that is connected to a standard laptop. Working with engineers, we also leveraged the development of machine learning to aid in tracking key biomarkers for swallowing³. These unique features of USES made it suitable for use in community clinics and primary care settings in the future. This is particularly important for our clinical populations with neurological disorders, when mobility can be a significant challenge, and for ensuring equitable access to healthcare in Scotland. Specifically, we are examining how this technology can be utilised to monitor changes in swallowing functions in individuals with progressive neurological conditions, as well as to support the maintenance or rehabilitation of swallowing.

Monitoring changes in swallowing function in individuals at risk of dysphagia matters because access to Speech and Language Therapists (SLTs) for swallowing assessments currently depends on referral systems that can involve delays. In some cases, individuals may not recognise or accept their symptoms until complications arise. For those living in rural and remote parts of Scotland, geographical barriers can make access even harder.

Portable ultrasound tools could potentially support earlier detection, regular monitoring, and more equitable access to care. At present, we are piloting a monitoring pathway with individuals living with muscular dystrophy. The aim is to identify how USES might help track changes in swallowing function in people with progressive neurological conditions,

enabling timely interventions and raising awareness of dysphagia within routine care.

Another promising strand of work is Ultrasound Visual Biofeedback (U-VBF). Teaching and learning swallowing exercises can be difficult because the relevant muscle movements are hidden from view. With U-VBF, patients see their tongue and hyoid movements on screen while practising, allowing SLTs to explain exercises more clearly and patients to engage more actively with therapy. Early studies with healthy participants are underway, with plans to extend to clinical populations. If proven effective, U-VBF could be integrated into community rehabilitation services, enhancing motivation and outcomes. For rural areas in particular, such tools could help overcome long-standing barriers to specialist rehabilitation.

The pathway to healthcare innovation is not always straightforward. In our case, it requires sustained interdisciplinary collaboration between clinicians, engineers and industry, as well as investment in implementation. Competitive research funding is required to support the development and clinical translation of ultrasound in speech and language therapy. Yet the cost of inaction is high: avoidable hospital admissions, poorer health outcomes and the quiet loss of quality of life. Ultimately, swallowing research is about giving voice to something silent. By making swallowing visible, we can begin to break the silence around dysphagia and create a more equitable, dysphagia-friendly society.

For more information, please visit www.swallow-vision.com

References:

¹ www.gov.scot/publications/neurological-conditions-estimating-prevalence-scotland-selected-conditions-using-gp-hospital-admissions-datasets/

² www.scotpho.org.uk/comparative-health/burden-of-disease/overview

³ [www.doi.org/10.1111/1460-6984.12712](https://doi.org/10.1111/1460-6984.12712)

The value of R&D is a conversation we must all be part of



Research and development (R&D) is a fundamental part of UK society. It is a driver of the economy, how solutions to societal problems are generated and the way we seek to understand the world around us. However, it cannot perform to its full potential if it is not championed, its virtues and challenges communicated to all those with a stake in it, which is all of us.

At Campaign for Science and Engineering (CaSE), the charity I lead, our mission is to advocate for R&D for the benefit of lives and livelihoods. We are the leading independent voice for UK R&D, supported by a diverse membership including businesses, universities, professional bodies, research charities, and individuals. Our members span the whole breadth of R&D – including discovery research, science,

engineering, and innovation across the public, private, and charitable sectors.

For the last four decades, CaSE has primarily focused on engaging with policymakers and the R&D sector, facilitating conversations that look to move us all forward together to a more productive place. While this is still very much a proud part of what we do, we have looked to expand that dialogue and engage with the largest stakeholder in research, the UK public.

LISTENING TO THE PUBLIC

Thanks to support from Wellcome, CaSE has been able to carry out landmark research into what the public think and feel about R&D. The insights we have gained from surveying almost 40,000 people in four years have helped us refine our political advocacy and identify more meaningful and resonant ways to engage with public audiences. Listening to public views will ensure that policy



Dr Alicia Greated

positions benefit not only the R&D sector but better serve society.

New polling we published on 11 November shows that 88% of the public think it is important for the government to invest in R&D and 50% think this is an acceptable use of taxpayers' money.

However, to many the benefits of R&D feel distant and unevenly spread through society. Around a third say they can't immediately think of any ways that R&D benefits the UK, and this figure rises to just over half when asked about benefits to them and their family.

“TO MANY THE BENEFITS OF R&D FEEL DISTANT AND UNEVENLY SPREAD THROUGH SOCIETY”

That the R&D sector can retain strong support from the public while its outputs feel so intangible should give us pause for thought. We cannot assume this support will continue, especially as financial pressures on individuals and the state increase.

Instead, it should be a reason for action: we can and must increase efforts to make R&D more human and more local. CaSE's research has consistently shown that emphasising the purpose of R&D, and the places it is happening, helps to strengthen this connection. For instance, although three-quarters say they know nothing or hardly anything about R&D in their local area, 70% would like to hear more from local researchers.

GEOPOLITICAL UNCERTAINTY

The UK has had the fortunate position in recent years of broad cross-party support for R&D. Of course, there have always been pockets of those who don't see innovation as a priority, or who are sceptical of science and its outputs, however, in this country the mainstream view that R&D is a valuable national asset has dominated.

This could also, until recently, have been said of the USA. Each day, however, seems to bring a new dose of sadness and worry at the precarious position USA research finds itself in. Restrictions on research topics, reduction in funding, and sky rocketing visa costs for skilled workers are just some of the administrative obstacles faced in the country. These developments are bad enough without getting into some of the overtly hostile and anti-scientific rhetoric that has come recently from senior political figures.

America is a cautionary tale for the UK R&D sector. Not because we are in the same starting position, or because we are about to have the same issues on our doorstep, but because even a fraction of the challenges being faced in the USA could be seismically destructive for our already fragile system.

This context makes it vital that we don't rest on the years of positive rhetoric and broad support we have enjoyed. We must engage all parts of the UK political spectrum and people in all communities across the UK. We must listen to what they have to say and make the case for why R&D can help improve their lives and livelihoods.

ELECTION OPPORTUNITIES

Although political advocacy requires constant work, elections present particularly fertile opportunities to communicate a message to the people that hope to wield power and to those that bestow the power upon them.

During last year's General Election, CaSE used public opinion insights to run a successful campaign that sought to demonstrate the value and relevance of R&D to the new cohort of MPs. New polling was analysed to provide constituency-level statistics, which were used to show candidates and newly elected MPs that their constituents wanted them to take action to support R&D, both locally and in Parliament.

This campaign received positive responses from across the political spectrum, generating new relationships and follow-on meetings with MPs – including with those who would not normally have been on the R&D sector's radar as likely supporters.

Building on this success, we are turning our focus to next year's Holyrood and Senedd elections. These elections come amid a shifting political landscape; there is an urgent need to proactively engage all new parliamentarians and positively influence their attitudes towards the Scottish and Welsh R&D sectors.

CaSE's 2024 polling showed that a majority would like to vote for politicians who will support R&D in the UK and would support their MP

voting in Parliament in favour of decisions that will support R&D in the UK. Our public opinion research has consistently found that a majority would also support more regional and local R&D. The main perceived benefits are growing the local economy, more opportunities for young people and more well-paid jobs in the area.

As a sector, we have a responsibility to show policymakers that R&D isn't just economically a smart choice, it is also a part of society that the public trust and want to see supported.

TALKING R&D ON THE DOORSTEP

I have spoken a lot about the critical importance of using what we know the public think and feel to make the case to UK politicians for supporting R&D. However, there is a flip side to this coin. As we know, not everyone in the public feels the same way about R&D, and importantly some people have very little awareness of what it is or does. We need to mobilise political support into meaningful dialogue with society.

We have found that R&D is intangible for many people. As I've mentioned, around a third of the public say they can't immediately think of any ways that R&D benefits the UK and some 45% think R&D in the UK benefits some more than others, with the wealthy and big businesses most often named as those who benefit most.

One other concerning finding we have seen is that there is a real risk of R&D no longer being seen as a priority by the public when

trade-offs have to be made with other major challenges facing society.

If we want this to matter to more people, there is a role for all of us, including elected officials, in engaging all parts of society in the conversation about how innovation impacts their lives in a very real way.

As part of our recent and upcoming political advocacy, CaSE is producing an expanding advocacy toolkit. In it, we offer clear, practical, and data-driven resources to help supporters of R&D connect with new audiences and cultivate lasting support.

From messaging strategies to supporting statistics, we aim to provide everything needed to tell a compelling story about R&D's impact and create a vision of a future powered by innovation.

A REQUEST

Whether you use CaSE insights and tools or not, I urge anyone who sees themselves as a supporter of R&D to have conversations about what others think and feel about research.

I truly hope that the UK doesn't head down the road that our American friends have found themselves on, but hope is not enough. It is on all of us who believe in the value of R&D to champion it, discuss it, and open it up to everyone in our society. For CaSE that starts with listening to the public, but it certainly doesn't end there, it is what we do with the insights that matters most.

Dr Alicia Greated FRSE, Executive Director of Campaign for Science and Engineering (CaSE)



The evolution of a language

– reanalysing a study of Gaelic from the 1950s



About 25 years ago, a scholar of Gaelic pronunciation, Anna Bosch, invited me to collaborate on analysing unpublished material from the Gaelic Survey of Scotland.

Much of this material was published in the 1990s but two superficial facts made this project seem unlikely. Anna was at the University of Kentucky and funded by the American Philosophical Society. And though Scottish myself, I have virtually no ability to speak the language. *Chan eil Gàidhlig agam.*

Luckily, phonetics (or speech science) does not demand any ability to communicate with real people, though it is useful in research design, analysis and impact.

Worse still, our work would not even involve any audio recordings of speech. Instead, the raw phonetic data was in the form of a written approximation using the International Phonetic Alphabet (IPA).

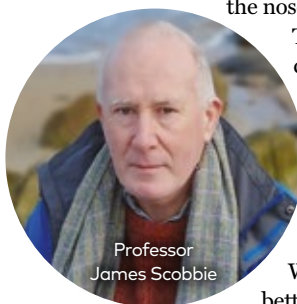
Thankfully, the survey data was very rich. Transcriptions of words, phrases and sentences had been made by eight or more phoneticians trained in fieldwork (and in Gaelic) all over the Gàidhaeltachd, between 1949 and 1963. More than 200 native speakers had contributed to the project. During fieldwork, the words and sounds they used when responding to prompts from a 48-page questionnaire was transcribed in extremely fine phonetic detail, over many hours.

The phonetic phenomenon we worked on is called ‘nasal mutation’ or ‘eclipsis’, in which the initial consonant of certain words alters.

For example, while the Gaelic word for ‘mud’ (poll) begins with a /p/ consonant, the similar ‘limb’ (ball) begins with a /b/. The phrases for ‘the mud’ or ‘the limb’ not

only incorporate the definite article (*am, giving – am poll & am ball*) The word-initial /p/ or /b/ can mutate along with the /m/.

The nature of this mutation varies geographically, so one of our goals was to map it. The other goal was to reanalyse the different IPA transcriptions to estimate likely changes of articulation. For every /mp/ and /mb/ sequence, for example, we considered how the transcription revealed how the onset, offset, and onset of vocal cord vibration had overlapped in time with the closing and opening of the lips and the lowering and raising of the soft palate. Simultaneously, vibration, closed lips and a lowered larynx generate [m], a hum. Without the vocal cord vibration, the same ‘labial nasal’ is ‘voiceless’, somewhat like a reverse sniff with air exiting the nose.



Professor James Scobbie

The articulatory timing and coordination of the changes to these three parameters can give rise to a wide range of sounds. This let us organise the 25 recorded IPA variants of nasal mutation into four types for /b/ and four for /p/.

With more transcribed data and better quantitative mapping skills, we could have better evidenced an even more subtle model of gradient change of timing underlying the dialectal variation, but we did what we could when we published in 2009. Even now I hope for a digital saviour with geographical information skills to revisit the entire dataset from our perspective.

But what we really need now, for Gaelic, Scots, English, Polish, British Sign Language and other significant community and heritage languages in Scotland is a new survey that

goes beyond geographical variation, to inform decisions about language policy in Scotland.

We need to capture the multilingual and multidialectal abilities that most people possess. Age, learned experience, personality, gender, social class and the purposes of our communication all shape how we (choose to) speak and how our brains perceive the speech of others in real time. Our attitudes to speech variation reflect socially constructed norms as well as personal experience.

In writing this piece I learned that the Arts and Humanities Research Council (AHRC) and Swiss National Science Foundation had co-funded just such a modern dialectological project for England and Wales. Well done to a brilliant scientific team. But it is 75 years since the last dialectological survey of English south of the border and such an update is long overdue. When will a similar project in Scotland build on expertise from the small and disparate theory-driven projects examining speech acquisition in children, or urban social variation?

In the 1950s, our individual abilities to vary our speech and to respond to the variation we encounter were not addressed. Current linguistic and phonetic research, however, can balance cognitive and social elements to address key questions of importance in relation to this uniquely human phenomenon. Speech is of fundamental importance to people, from their most intimate and interpersonal moments to the heights of creativity and culture, and our various voices deserve study, celebration and support.

Professor James Scobbie FRSE,
Director of the CASL Research Centre,
Queen Margaret University

“SPEECH IS OF FUNDAMENTAL IMPORTANCE TO PEOPLE, FROM THEIR MOST INTIMATE AND INTERPERSONAL MOMENTS TO THE HEIGHTS OF CREATIVITY AND CULTURE”



Speaking to each other

In this era of volcanic politics it is surely obvious that one of the causes – not a mere symptom, but an underlying reason for the disruption – is the fragmentation of our public discourse. We talk to each other with less civility and understanding. There is more shouting, and abuse. More often than at any time in living memory, social division is presented in politics as desirable.

For about two decades we've been getting used to the revolution in communication among ourselves, to a point where our social media skills have, for many people, led to isolation instead of connection. Togetherness is the illusion; atomisation the reality.

Meanwhile, the media landscape has become a quagmire.

A grey-bearded journalist is open to a charge of nostalgia, of course. As late as the early 1980s, Linotype machines would cast pages in molten lead as they'd been doing unchanged for a century, and we loved the sound of the presses churning. That's gone with the wind, as was inevitable one day, and new technologies can produce better and bigger newspapers. But where are they?

Circulations have fallen precipitously, standards of basic literacy have plunged, the desire to inform often gives way to a temptation to satisfy the prurient mood of the moment. A former editor of *The Guardian*, Alan Rusbridger, was widely derided in the 1990s when he predicted the demise of the press as we know it. Unfortunately, he was right.

But surely, it's said, there are more readers of newspaper titles online than ever before. Why does it matter? Because a valuable public space for information and discussion

has given way to an auction for cheap thrills, determined by website editors who are interested to an obsessive degree only in how many clicks they can get on a page. Increasingly, that is how success is measured in a downward spiral.

If you want to measure the effect this culture change has had on political discourse, look to the United States. As so often, it's ahead of us (whether we like it or not). Everyone serious in American politics – across most of the spectrum – will talk to you privately about the consequences of changes in the consumption of news that mean vast number of citizens will choose, as they're encouraged by big-money campaigns, to watch or listen only to content that will reinforce their views and hardly ever challenge them.

I spoke recently to the proprietor of a public radio station in the Midwest, defunded by the Trump administration and depending now on listener-subscription alone (a very rickety business model). He believes in straightforward balanced journalism, regrets the polarisation of journalism in line with high-octane politics, and said to me wistfully: "The middle is a lonely place to be right now".

Lonely indeed. Divisiveness is the badge of the Trump era: not an unfortunate consequence, but too often its very purpose.

So where is the public space for debate and rational argument, when consensus is presented as the wimps' option? Getting it back means first talking about why it matters.

We may like to believe that there was a time when this wasn't necessary.

Forget that. Now it is needed. Not only journalists but anyone in any segment of the public sphere has to prioritise the need for truthfulness in public comment and argument. Claims must be tested and refuted when they're found wanting. Dangerous social and political tropes

have to be exposed for what they are; above all, demagoguery has to be challenged. The pinprick lights of independent, brave and thoughtful journalism must be cherished.

How obvious this all sounds. But anyone who tunes in sensitively to the cacophony of much of the contemporary American political debate will

realise that if we don't struggle for the right to disagree civilly, that freedom could be grievously eroded, or even disappear.

If this seems too doom-laden, so be it. But it is hard – trying to hold on to the journalistic values of the BBC and shared by our other mainstream broadcasters, which remain intact – not to fear the danger of sliding hopelessly into a public debate that offers lots more mud and gore but very little enlightenment.

That outcome would not only be a disaster for the way we speak to each and exchange information, but for our politics too. The two are intertwined and feed off each other, so often to their own detriment.

What was the price of liberty? Eternal vigilance, certainly. But now it needs action too to defend what might be lost.



James Naughtie

James Naughtie FRSE,
Special Correspondent, BBC News

‘A reference point for a world in crisis’

If there's one thing that pretty much everyone can agree on, it's that music is a fantastic medium for communication. Whether we're talking about the blues, Viennese classics, opera, or death metal, music opens doors to meaningful connections.

One way to think about musical communication is to focus simply on the sound signal. Consider Jimi Hendrix's 1968 version of Bob Dylan's "All Along the Watchtower" and reflect on the seemingly endless layers of signification and meaning contained in these 241 seconds of music.

There are some simple ways to speak about the technical composition: the narrative structure of verses and guitar solos (there is no chorus); the cyclic harmonic progression (there are only three chords), the three-player instrumentation.

Dylan's lyrics evoke something more obscure ('a reference point for a world in crisis', according to one of many scholarly interpretations of the song¹); yet even Dylan famously considered Hendrix's interpretation to have found and created new depths within the song.

It is powerful stuff: the cycling chord progression holds us captive, but the invention never stops. The record communicates with such integrity and conviction that we can step into a coherent, imaginary place and just be there for a while, absorbed in 241 seconds and just 12 lines of lyrics.

Widely regarded as one of the most significant in 20th century

popular music, the record was created through the work of Hendrix and musician collaborators Mitch Mitchell, Noel Redding, and Dave Mason, with the assistance of producers at two different studios over a period of months. In the past half-century, it has received fairly continuous attention from listeners, critics, film directors, scholars, and musicians.

"All Along the Watchtower" was first released as 7" vinyl; today you can listen to it through digital streaming. Such portable, easy access emphasises the idea

of music communication as one-way transmission. However, the science of acoustics reveals complex interactions between performers, instruments, listeners, and environments, and cognitive science sheds light on the interplay between auditory perception, cognitive processing, and cultural influence in shaping our experience of music.

It's intuitive to approach musical communication by focusing on the sonic signal. Many people appreciate music and view it as part of their identity, although most don't consider themselves musicians. This can lead to a view of music as a cultural artifact. However, musically-structured sounds communicate more than that – they reveal our physicality and options for movement. Melodic pick-ups draw attention to phrases with unique energy and contour, while timbral qualities convey variations in materials and instruments.

Back to "All Along the Watchtower", the driving, high-frequency percussive energy of the rattling tambourine arrives and indicates something changing, something new.

Through Hendrix's delivery, Dylan's lyrics signal characters and narrative sequences unconstrained by reality.

Research into music's role as human communication has evolved substantially alongside critical and technological advancements. Sociologists and ethnomusicologists have written about musical communication as a means of organising human behaviour. Music exists through shared practices and social interactions: scientifically,



we can frame music as process, and our understanding of the way that people use music to co-create meaning, identity, and connection is growing.

Advancements in technology and the widening scope of research have exposed to scientific study only a fraction of the diverse contexts in which people engage with music, but have thoroughly expanded academic discourse around music, and weakening the effectiveness of any one theory that tries to explain how music communicates meaning.

These advancements shape how we conceive of music as a medium for connection, the communication mechanisms we conceptualise, how social coherence is engendered, and the forms of musical engagement that connect individuals. Such intricacies can only be grasped by considering the interplay between technical, creative, and social factors, which is why research-focused university music departments are inherently multidisciplinary.

At the University of Edinburgh, for example, music brings together expertise not only in performance, but also musicology, music psychology, composition, sound design, and acoustics so that students learn how music's profound impact on human experience facilitates connection – between individuals, communities, and cultures.

Dr Nikki Moran, Senior Lecturer in Music, University of Edinburgh, Editor-in-Chief, *Psychology of Music* journal, and RSE Personal Research Fellow

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Dr Nikki Moran



Quantum physics is changing how we communicate, one photon at a time

From the first lighthouses shining warning signals to ships across stormy seas, light has been used by humans to communicate quickly across large distances. Today, we are using lasers to send information across deep space, with the first high-definition video featuring a cat called Taters, beamed to Earth last year by the NASA spacecraft Psyche. Light is the perfect information carrier. It is incredibly fast, can be transported through hair-thin optical fibres, and can carry messages using its many properties such as its colour, time-of-arrival, and even spatial structure (think cameras). While modern communication networks such as the internet rely heavily on our ability to control and transport information encoded on pulses of light, a new type of communication technology is emerging that uses individual quantum particles of light, or photons, to encode and transmit information.

Just as Schrödinger's bizarre thought-experiment describes a cat – not in this case Taters, but Schrödinger's cat – being both dead *and* alive, a single photon can exist in a superposition of its many properties – red *and* green, arriving early *and* late, or carrying an image of a dog *and* a cat. Measuring one of these properties is like opening Schrödinger's box – the photon would randomly appear to be either red or green on your detector (if you decided to measure its colour). Using these properties, photons can encode quantum bits of information (qubits) that can be in a superposition of zero and one (in contrast with classical bits that must either be zero or one). The quantum state of a photon can be understood as a mathematical description of the probabilities of different measurement

outcomes, rather than an actual description of physical reality. However, this is a topic of intense debate that branches into fields such as philosophy and has inspired many a Hollywood movie!

Regardless of whether we can agree on their philosophical interpretations, these seemingly strange quantum phenomena are enabling exciting advances in technology today. If two people, let's call them John and Sarah, want to communicate secretly with each other, they can use a random string of numbers that is known only to them to encrypt their message. Using quantum physics, John and Sarah can generate such a shared random 'key' in an unconditionally secure manner. First, John encodes his key on a string of photonic qubits and sends them to Sarah, who receives and measures them to decode the key.

Now, the outcomes of measurements made on a quantum state intimately depend on *how* it is measured. For the key to be shared correctly, John and Sarah must use the same method to prepare and measure their qubits. Funnily enough, they can decide to only keep the qubits where their methods agreed *after* the protocol is completed. If an eavesdropper were to try and intercept their communication by measuring the qubits en route to Sarah, they would disturb the quantum states carefully prepared by John. This would result in the final key containing errors and thus revealing the presence of the eavesdropper.

This is an incredibly powerful way to protect information as it relies on the laws of physics to work, as opposed to a complex code that could be broken by a powerful enough computer or hacker. Quantum encryption is just one of the

many exciting applications made possible by harnessing the quantum properties of single photons. Quantum computing is another emerging technology that has enormous potential to impact society. Quantum computers could be used in the development of new and more effective medicines, exotic materials for batteries and catalysts, and even help us better predict major climatic events. However, quantum computers are incredibly challenging to build, with current efforts limited to a few thousand qubits. Large-scale quantum computers in the future might be constructed by interconnecting many smaller quantum processors with photonic links, similar to how a modern data centre works.

Scotland is at the forefront of the quantum technology revolution, with significant quantum research being carried out at many Scottish universities. The £20 million UK National Quantum Technology Hub in Integrated Quantum Networks is hosted at Heriot-Watt University, with members including the Universities of Glasgow, Strathclyde, and Edinburgh. With more than 50 industrial partners such as BT and Toshiba, the goal of this UK-wide collaboration is to develop quantum networking technologies at all distance scales. The UK has also seen the emergence of more than 70 quantum technology startups in recent years, indicating the strong commercial growth in this area. The quantum future is bright and will dramatically change how we communicate with each other, for the better.



Professor Mehul Malik

Mehul Malik FRSE, Professor of Physics, Institute of Photonics and Quantum Sciences, Heriot-Watt University

Studying the costs and benefits of health messaging to young women

Physical inactivity is a leading risk factor for both poor physical and mental health, with women being less likely than men to engage in exercise. This imbalance

is evident from childhood, persists throughout adulthood and results in women being more likely to suffer the negative health consequences of being inactive. This may be unsurprising to many, given that exercise and sport have long been gendered, which fosters widely held stereotypes that act to discourage women from participating.

Common sayings in popular culture and media, such as “run like a girl” or “throw like a girl”, link women to weakness in the context of physical activities and can harm women’s confidence and reduce their engagement in such activities. These stereotypes are often reflected in the health messaging women receive, with many campaigns taking a gender-neutral or male-centric approach that fails to address the specific needs and motivations of women.

Efforts to create more inclusive, women-focused campaigns began only in the late 20th century, marking an important step towards challenging such stereotypes and supporting women’s engagement in sport and exercise. But more work is needed to help bridge the physical activity gap between

men and women. This includes research to understand the best ways in which to structure physical activity communications aimed towards women audiences.

Studies have demonstrated that the way in which the risks and benefits of exercise are communicated can significantly influence how people engage, or fail to engage, with tailored messages being more effective. However, how to tailor messages most effectively for women remains an under-researched topic, despite the growing popularity of women-centric messaging such as “This Girl Can” and “Move Her Mind”. Indeed, our own findings indicate that 70% of inactive women decline support to increase their own physical activity, even when they are informed of the health risks of inactivity and are physically able to start exercising¹. This finding may

be partly explained by message reactivity, whereby individuals dismiss or ignore messages and react negatively to communications that are perceived to threaten their freedom or personal choices. For example, an inactive woman may dismiss a message about exercise if she perceives it as a criticism of her own behaviour.

This raises the critical question of which communication strategies can most effectively engage women with the content of exercise-related messages and, in turn, indirectly support them to act for the benefit of their own health and wellbeing?

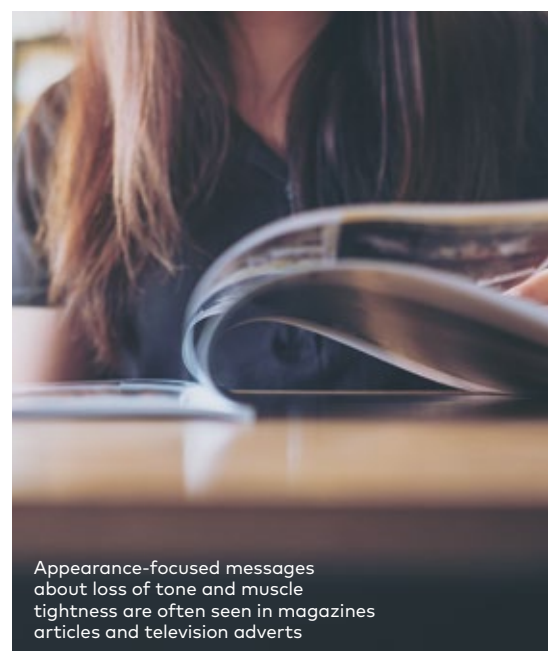
To explore this, we examined how different ways of framing messages around physical



Dr Kimberly More



Dr Curt More



Appearance-focused messages about loss of tone and muscle tightness are often seen in magazines articles and television adverts

activity influenced message reactivity among young women, between the ages of 18 and 25, who were physically able to exercise but did not meet UK or global activity guidelines². Specifically, we compared gain-framed messages, which emphasise the benefits of exercising, such as better bone and heart health, with loss-framed messages, which highlight the risks of physical inactivity, like worse bone and heart health. Each framing condition was paired with either appearance-focused outcomes such as loss of tone and muscle tightness, as is often seen in popular magazines articles and television adverts, or health-focused outcomes, as is typical in public health campaigns, like fatigue, immune system functioning, and bone and heart health. This approach allowed us to



Messages should focus on what young women can gain from regular exercise in terms of their physical and mental health

“AROUND 76% OF WOMEN REPORTED THAT THE MESSAGE PROVIDED INFORMATION THEY HAD NOT KNOWN BEFORE, SHOWING THAT THE CONTENT WAS INFORMATIVE”

test for the combination of message framing that was most effective at reducing message reactivity and provided the most effective form of communication. Additionally, messages were tailored to outcomes particularly relevant to this age group, to ensure the content of the messages resonated with their priorities and experiences.

To begin, we recruited 48 insufficiently active women to read the messages that we developed to ensure that they properly communicated the intended risks or gains, as well as the health- or appearance-focused outcomes, in a way that resonated with our target audience. Participants were randomised to view one of the four messages and then rated the received message on several dimensions, including (1) the extent to which the message discussed what they could lose from not engaging in regular physical activity, (2) the extent to which the message discussed what they could gain from engaging in regular physical activity, (3) the degree to which the message highlighted health-related outcomes associated with exercise, (4) the extent to which the message focused on appearance-related outcomes, and (5) whether they perceived the message as scientifically based.

These measures allowed us to assess how effectively each message communicated risks or benefits and intended outcomes, while also maintaining credibility. The messages were interpreted as intended as participants

agreed that all four messages were scientifically based and confirmed the categorisation of each message as either gain- or loss-framed and as focused on appearance or health outcomes. Therefore, we were confident that any differences in responses reflected genuine

effects of message design rather than miscommunication.

Following the testing of our messages, we recruited a new cohort of 369 insufficiently active women who were randomly assigned to receive one of the four validated messages. After viewing one of the messages, participants indicated whether the information was new to them and rated their reactions. About 76% of women reported that the message provided information they had not known before, showing that the content was informative.

We found that loss-framed messages, which highlighted the risks of being inactive, caused stronger negative reactions, including anger, feeling that their choices were being restricted and discounting the message, compared with gain-framed messages, which emphasised the benefits of exercise, when focused on health outcomes. Messages framed around health outcomes were also found to generally cause fewer negative reactions than those focused on appearance.

These findings suggest that exercise messages for young women should be carefully framed to reduce negative reactions and increase engagement with the content. Gain-framed messages that emphasise the benefits of activity, particularly when focused on health outcomes, appear to be the most effective. In contrast, messages that highlight appearance or focus on potential losses or downsides of being physically inactive are

more likely to provoke resistance and may cause women to disengage with the intended content entirely.

Communicating the importance of exercise for overall health and wellbeing is a key first step in the behaviour change process, as education alone is often necessary but not sufficient to facilitate lasting change. Attention to the priorities of the target audience, the credibility of the information and the framing of outcomes can make exercise messages more effective in encouraging openness to behaviour change.

Our work suggests that messages should focus on what young women can gain from regular exercise, particularly in terms of their immediate overall physical and mental health. These insights offer practical guidance for health practitioners, policymakers, and campaign designers seeking to support young women in adopting and maintaining active lifestyles.

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Dr Curt More, Assistant Professor, Department of Psychology, Heriot-Watt University

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Making data more accessible

How visualising our data makes us reflect more deeply on our own lives

We live in a world fuelled by data, yet not everyone is data literate. Many people struggle to understand, interpret, and critically evaluate data, as well as make decisions based on that information. This has alarming implications for everyday life, from misinterpreting vaccination risk to wrongly calculating savings over time, and all points in between.

This gap between the vast amounts of data that we generate in our wake and our understanding and utilisation of it brings the following challenge: how can we communicate key information to the public in a way that it is understood by everyone?

The award-winning information designer, Giorgia Lupi, points out in her Data Humanism manifesto:

“The more ubiquitous data becomes, the more we need to experiment with how to make it unique, contextual, intimate. The way we visualise it is crucial because it is the key to translating numbers into concepts we can relate to.”

The field of data and information visualisation has lots to offer here – certainly more than simply bar charts, data dashboards, and infographics. Storytelling through data visualisation, also known as narrative visualisation, has been shown to be more engaging and to be associated with higher comprehension compared with conventional methods such as graphs and so forth.

Among the different genres of narrative visualisation, I would highlight data comics, which were pioneered a few years ago by Dr Benjamin Bach (University of Edinburgh

and INRIA). Data comics combine visual language and narrative patterns from traditional comics with data and visualisation to tell a story. They are considered to be a non-threatening and engaging medium that “humanises datasets” and breaks down complex information in an engaging fashion.

At the University of St Andrews, we have been investigating how to best design data comics for communicating health information and how health data comics are perceived by the public, including people with low data literacy. Preliminary results are very encouraging: an interactive data comic developed to communicate cancer

data was perceived to be more engaging, with participants demonstrating a much better understanding and recall of the information they were presented with, when compared with information displayed in an article consisting simply of text and charts.

Encouragingly, participants’ self-assessed likelihood to attend screening upon interacting with the data comic was also very high – significantly higher than for the text-based article. This has valuable implications for how public health campaigns might be better conducted in light of this and, therefore, ultimately on people’s health and wellbeing.

Another somewhat unconventional approach to data visualisation is that of data physicalisation. Rather than visualising information using ink or pixels, physicalisation involves turning data into physical objects that one can see and touch.

Any kind of materials can be used for this, from string and Lego bricks to carved wood and coffee beans. By making data tangible, it often becomes more relatable and fun, more accessible and less scary for certain

audiences, so lots of potential for communicating data to people with low data literacy. Research has also shown that physicalisation encourages self-reflection and self-expression. I personally find this fascinating. In our recent workshop, ‘Your Data, your story’, which was offered as part of the RSE’s *Curious* festival of knowledge, we got to witness this first hand.

We invited participants from diverse backgrounds to write down a small dataset about themselves and physicalise it with materials of their choice. For example, how much coffee did you have each day last week? When presenting their own data, in the form of piles of coffee beans, for instance, participants often remarked on insights and reflections sparked by the construction of the personal dataset which they hadn’t anticipated.

Despite these creative and innovative approaches to communicating data, this is still a relatively young area of research and practice, with lots of remaining open questions. In our quest to advance the field, we should always follow Giorgia Lupi’s recommendation to “remember that data is imperfect (as we are)”.

Dr Areti Manataki, Lecturer in Computer Science, University of St Andrews School of Computer Science and Young Academy of Scotland member



Dr Areti Manataki

WANT TO FIND OUT MORE?

- Data Comics: datacomics.github.io
- Data Physicalisation: dataphys.org/list
- Data Visualisation: informationisbeautiful.net
- Data Humanism: giorgialupi.com/data-humanism-my-manifesto-for-a-new-data-world

Crowdsourcing the Scots language in the 21st century

Step out onto the streets of Glasgow, Dundee, and Aberdeen and you can hear some version of Scots – but what exactly is Scots, where is it spoken, and by whom?

Present-day Scots is characterised by the Scots Linguistic Continuum as having Standard Scottish English (SSE) at one end and Broad Scots at the other. SSE is close to Standard English but with an overlay of distinctly Scottish sounds, while Broad Scots is much further from Standard English with its own words, sounds, and sentence construction.

In terms of the social profiles, SSE is spoken by middle-class speakers and in more formal situations such as in schools, while Broad Scots is spoken by working-class speakers and in informal situations such as with family and friends. Speakers may style-shift up and down the continuum according to, among others, interlocutor and context.

In terms of the geographic picture, so-called Lowland Scots is typically spoken in the south, east, the north-east, and Northern Isles, while Highland English is typically spoken in the Highlands and Outer Hebrides. This is explained by the historical record: while Scots spread eastwards and northwards over a number of centuries, developing its own norms of use, Gaelic continued to be used in the north-west, resulting in the so-called Linguistic Highland Line.

Two key points arise from this description of Scots: 1. in the Scots Linguistic Continuum, speakers at the Broad Scots end of the continuum use many Scots forms, while SSE speakers use very few. 2. Scots is not spoken in the Highlands and Islands.

How true is this characterisation of who speaks Scots and where? *Speak for Yersel* (www.speakforyersel.ac.uk) sets out to answer this question by asking people across Scotland to tell us about the words, sounds, and sentence structures they use. To do this, crowdsourced participants answered a series of questions on Scots terms they do or do not use. The snapshot of Scots gleaned from thousands of speakers who participated in the survey can provide a rich picture of the Scots language in the 21st century.

The questionnaire contains 90 questions but here we hone in on two specific groups

within those. The first is an iconic feature of Scots – the different vowel sounds (or phonetic alternations) used in different sets of words, including:

- (1) a. house/hoose; out/oot; down/doon
b. lie/lee; die/dee; fly/flee
c. stone/stane; home/hame; more/mare
d. make/mak; take/tak; break/brak.

These are known as *Overt Scotticisms*: they are above the level of consciousness, noticed by speakers and commented on as being Scots. In contrast, our second set of Scots forms (2-5) which involve different sentence structures (morphosyntactic alternations) are *Covert Scotticisms*: they fly below the radar, going largely unnoticed in speech:

- (2) a. Are you *wanting* to come with me? (Scots)
b. Do you *want* to come with me? (Standard English)
- (3) a. I'm going to *my bed*. (Scots)
b. I'm going to *bed*. (Standard English)
- (4) a. When are you back *at the school*? (Scots)
b. When are you back *at school*? (Standard English)
- (5) a. The cat *needs fed*. (Scots)
b. The cat *needs to be fed* ~ The cat *needs feeding*. (Standard English)

Figures 1 and 2 map the responses that people gave to the question of whether they would use these forms or not. Figure 1 shows the results for the phonetic forms and Figure 2 for the morphosyntactic forms.

These two maps show very distinct uses of these overt and covert Scotticisms. For the morphosyntactic forms (Figure 2), 75% and above of speakers across the whole of Scotland report that they would use these forms. In sharp contrast, the phonetic forms (Figure 1) are geographically distinguished: some areas such as the north-east and south-

west report relatively high rates of use, while the Highlands and Outer Hebrides report significantly less use.

In other words, the morphosyntactic forms are used throughout Scotland, while the phonetic forms are used in Lowland Scots only.

These results suggest that the Linguistic Highland Line holds for pronunciations of words such as *oot* and *heid*, but not for sentence structures such as *Are you wanting to come with me?*. When we took a deeper dive into the data, we found something else: participants who

Figure 1: % of people who report using *doon*, *stane*, *heid*, etc

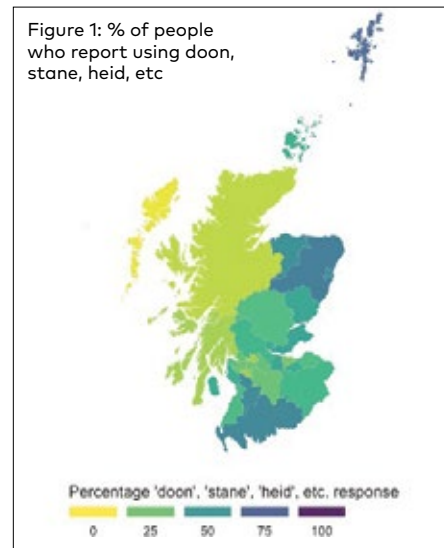


Figure 2: % of people who report using the cat needs fed, etc



had gone to university generally reported that they didn't say *hoose* and *stane* but they did say *I'm going to my bed* and *Are you wanting to come with me?*. This shows that SSE may not use Scots pronunciations but the speech is likely full of Scots sentence structures.

So what exactly is Scots, where is it spoken, and by whom? *Speak for Yersel* reveals the complexities of this question, and will continue to do so in future years: the website remains open for speakers across Scotland to tell us whether they say *doon*, *mak*, *my hair needs washed* or a myriad other Scots forms we hear around us every day.

Professor Jennifer Smith FRSE, Professor of Sociolinguistics at the University of Glasgow



Professor Jennifer Smith

Adaptive re-use: Communicating the future while celebrating the past

As is widely known, buildings are major energy consumers, and demolishing them wastes embodied energy while consuming significantly more to rebuild. Adaptive reuse – the repurposing old buildings for new functions – offers a sustainable response to the climate crisis, can be utilised for almost any building type, and helps preserve and communicate architectural heritage and cultural identity.

My interest in adaptive re-use began during my studies when training to be an architect at the University of Edinburgh in the late 1970's, inspired by visits to abandoned 19th Century industrial buildings in and around Glasgow, Edinburgh, and beyond. Their expressive forms and enduring atmospheres suggested to me they were still "ready for work". Later, my travels across North America deepened this passion, particularly through experiencing, first hand, seminal works, often in disrepair by, amongst others, Louis Kahn, Frank Lloyd Wright, and the Chicago School of Architects.

This foundation informed my early career at Cambridge Seven Associates in Boston and Richard Rogers Partnership in London, both of which blended innovation with respect for the past. When I co-founded my first practice in 1984, our early projects were exclusively repurposing rather than renewing industrial buildings into design studios, galleries, and bespoke offices for the emerging cultural sectors. Without realising it, we were early advocates of adaptive re-use, communicating this to our clients and professional colleagues.

Since forming John McAslan + Partners in 1993, our work has developed to involve adaptive re-use across diverse contexts and buildings of scale, and represents a significant part of our ethos and portfolio. We group these projects into three types: Repurposing; Repair and Renewal; and Turning Old into New.

In our repurposing projects, we regenerate a building's function while maintaining its form. For instance, The Roundhouse, the landmark former railway turntable in Camden designed by the engineer Robert Dockray and the railway pioneer Robert Stephenson, and built in 1846, became a versatile and leading London arts venue through subtle structural and acoustic upgrades. Our Osney Power Station project in Oxford, nearing completion, reimagines an industrial shell into a global leadership centre for SAiD Business School, while in Doha, we reworked four historic courtyard houses from the early twentieth century into the Msheireb Museums, celebrating Qatari history, while

combining preservation with modern insertions. Our largest examples of repurposing are represented by two major projects in Moscow, completed some 10 years or so ago. At the Stanislavsky Factory and Bolshevik Factory we transformed two derelict industrial sites into mixed-use cultural, residential, and commercial hubs, with new public realms, museums, and theatre spaces.

Repair and Renewal retains a building's function while enhancing performance. An early example of our R and R portfolio was the transformation of Frank Lloyd Wright's 1950's Polk County Science Building in Lakeland, Florida, a barely useable teaching facility at this multi-building campus.

Here we preserved Wright's signature concrete block system, which he originally devised in the early 1920's, while upgrading its usability.

In Glasgow, our work on the Burrell Collection, originally designed by the Cambridge architect academic Barry Gasson, revitalised this late-Modernist

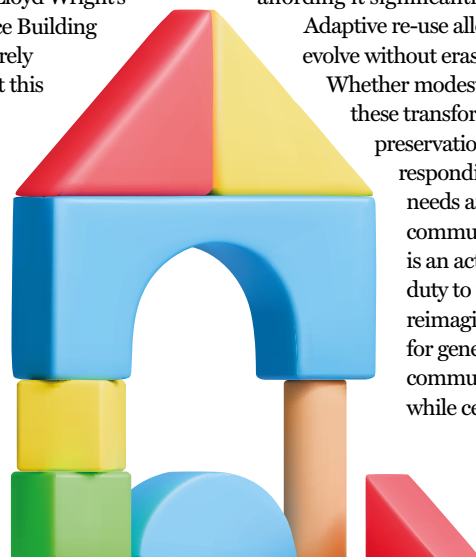
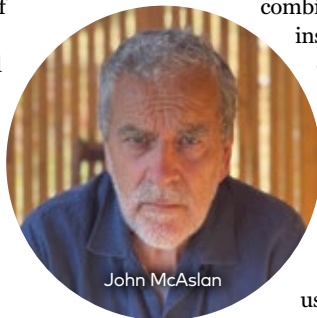
but dilapidated landmark with surgical upgrades: renewing the roof, upcycling its glazed facades, enhancing its energy systems, expanding exhibition space, representing the collection while communicating it more dynamically with accessible art stores and conservation areas and, crucially, reconnecting the Burrell to its park setting.

The same approach guided our rebuilding of the Iron Market in Port-au-Prince after the 2010 Haiti earthquake, where our work also established a platform for the retraining of its 750 displaced vendors to help reconstruct the building that once formed the city's commercial heart.

In Turning Old into New, we transform and expand complex existing infrastructure to meet modern demands. At King's Cross Station, London, we removed unsympathetic additions and inserted a dramatic new concourse behind the historic façade. This increased capacity for its expanding use as a major transport hub. Its centrepiece, the vaulted, fan-like structure – one of Europe's largest single-span station canopies which we designed with Arup engineers – brought renewed clarity and dignity to the passenger experience. Last year, we completed a similar transformation at Sydney Central Station, where our vast new canopy unifies existing platforms with new metro lines beneath, reshaping the city's main interchange and affording it significantly increased capacity.

Adaptive re-use allows buildings to evolve without erasing their past.

Whether modest or monumental, these transformations blend preservation with innovation, responding to environmental needs and enriching communities. Each project is an act of stewardship – a duty to retain, enhance, and reimagine the life of buildings for generations to come, communicating the future, while celebrating the past.



John McAslan FRSE,
Executive Chairman,
John McAslan +
Partners

Science communication on the streets of Glasgow

Science need not be confined to a laboratory, nor research to a library. Since 1998 the University of Strathclyde has been conducting guided tours of Glasgow, educating students and others on the evidence of scientific research that is hiding in plain sight on the streets of the city

“Science on the Streets” is a series of walking tours around the city centre of Glasgow where we explore the history of science and technology

behind objects, from statues to cages over graves, in locations across the city. Currently there are three tours. The first starts in George Square and ends in the graveyard of the Ramshorn Church in Ingram Street; the second wanders through Glasgow Cathedral’s graveyard and the Necropolis; and the third explores Glasgow Green.

On our tours, for example, we bring attention to the two statues in George Square where the subjects are seated (note on chairs and not on horses). The statues are of James Watt and Thomas Graham. We discuss James Watt’s invention of the separate condenser which significantly improved the steam engine, helping to launch the industrial revolution. We discuss Thomas Graham’s contributions to chemistry including his pioneering work on dialysis, a term he coined from analysis by diffusion, where molecules of different sizes are separated in solution by exploiting the difference in their rates of diffusion through a semi-permeable membrane. We point out the ‘tape measure’ on the wall of the City Chambers; reflect on who in the past had the sharpest knives for surgery (the barbers); discuss Glasgow’s chemical industries (the invention and manufacture of bleaching powders by Charles Tennant and waterproof fabric by Charles Macintosh); and highlight Lord Kelvin’s contribution to the success of the first transatlantic cable.

We tell stories of body snatchers where we pose the conflict between the need for bodies

to train surgeons, at a time when the only legal source of bodies was executed criminals, and the desire of the relatives of the deceased that graves were not robbed, hence the cages over graves. We end each tour with the tale of the attempt of the two Glasgow scientists, Andrew Ure and James Jeffray, to bring an executed murderer, Matthew Clydesdale, back to life using electricity. These gruesome experiments led to the animation of Clydesdale’s legs, chest and face: “Rage, horror, despair, anguish and ghastly smiles united their hideous expression in the murderer’s face, surpassing far the wildest representations of a Fuseli or a Kean”.¹

Our tour has its roots in a walking tour for first year physics students, developed by Dr Pete Maas of the Physics Department, University of Strathclyde, to explore measurement. Pete showed the students the standards of imperial linear measures in George Square. There are three sets of measurement standards: the standard inch, foot, two foot, and three foot, which are mounted on the wall of the City Chambers; and a standard chain and links; and 100 feet within the square. They visited the Foucault Pendulum in Princes Square, and ended the tour with a discussion of resonance and thermal expansion at the South Portland Street Suspension Bridge.

In 1997 myself, Pete and PhD student Paul Middleton applied for funding from the British Association for the Advancement of Science to expand on Pete’s tour and develop an activity for Science, Engineering and Technology Week (SET98). Our aim was to attract an audience that in general did not engage in science but would be keen to know more about the history

of their city and would be intrigued by the body snatchers and galvanisation experiments.

The funding paid for students to do research (many hours were spent in The Mitchell library) and deliver the tours, and the setting up of a website, the latest version, produced by Dr Jochen Bruckbauer, can be accessed at: www.scienceonstreets.org.uk.

We have been delivering tours since 1998, during SET week, the Glasgow Science Festival, the Merchant City Festival, the Institute of Physics ‘Big Bang’ festival, and on demand. Our audiences include both the people of Glasgow and visitors to the city. Overseas participants have included a school group from France and medical students from the USA. We spent a number of summers delivering tours to school children attending

Strathclyde’s Summer Academy. For those that can’t walk the streets of Glasgow, Jochen and I now deliver talks to groups across the west of Scotland.

We continually update our tours when we read or are given more stories from audiences to highlight the science which is in plain sight on our streets.

Dr Carol Trager-Cowan FRSE, reader in Physics at the University of Strathclyde

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¹ Andrew Ure: “An account of some experiments made on the body of a criminal immediately after execution, with physiological and practical observations”, *Journal of Science and the Arts* 6, 283-294 (1819). The story of the “Galvanisation of Matthew Clydesdale” narrated on our tour was written by David A. Stevenson.



Dr Carol Trager-Cowan

The euphemisms about menstruation, and what we lose by their use

Have you heard people say 'shark week', 'Auntie Flo', or 'the painters are in'? These are euphemisms commonly used for 'menstruation' in English. Germans might say 'strawberry week', the Taiwanese 'coming to wash', and in French you might even say 'the English have landed'.

People across the world avoid speaking about menstruation, as if saying the very word 'menstruation' could somehow stain them. (The irony is that some linguists believe even the word 'menstruation', Latin for 'monthlies', to be itself a euphemism, as the ancients thought the word 'blood' too powerful to say.)

This age-old taboo and silence adds to menstrual stigma in a vicious circle, making it ever less likely for people to choose to communicate about it publicly and clearly. How we speak about menstruation – and that we speak about menstruation – matters. If we do not have clear words for menstruation, this leads to real health inequalities when people are too embarrassed to talk to their GPs about menstruation-related problems clearly and convincingly.

Scottish-born poet Hollie McNish has a very funny piece about how to give yourself the courage to talk to your GP about your vulva: practice by pretending you are talking to a car mechanic about your Volvo.

“PEOPLE ACROSS THE WORLD AVOID SPEAKING ABOUT MENSTRUATION, AS IF SAYING THE VERY WORD ‘MENSTRUATION’ COULD SOMEHOW STAIN THEM.”

The truth is that GPs are likely as embarrassed as their patients at physically examining them. One of McNish's practice scenarios goes: 'If the mechanic doesn't look at the Volvo but instead tries to diagnose the problem with closed eyes and just offers you thrush cream for the five-hundredth time instead, say: Could you actually look at my Volvo please?'.

The Scottish Government's 'Let's Call Periods, Periods' campaign tried to tackle this in 2020 as part of their efforts to make Scotland a more period-friendly country. The Scottish Period Products Act 2021 was the first law in the world obliging local authorities to make products available for free to everyone who needs them. But products are only half the solution: menstrual literacy – being able to understand and communicate what goes on in our bodies clearly and without resorting to euphemism – is much more important. There is not much point in having a compact applicator tampon if nobody has told you how to use it, as I know from my own recent experience.

A lot of communicating well about menstruation is owning it. Research we have done in the Menstruation Research Network (MRN) shows that even the politicians who campaigned for the world-leading and taboo-busting Scottish law spoke about people who menstruate in the third person – ('they') but used the first person ('we') for themselves as the parliamentarians helping 'them'. We academics are also good at distancing ourselves from menstruation, even though most of us have experience of menstruation. This is part of a strategy even found in ancient medical texts, where men writing and exchanging texts about women's menstruation gave them added authority and

prestige, though they describe menstruation itself as shameful and unclean.

Communication is culturally specific, and not all language strategies work in all contexts. In the MRN, we recommend avoiding terms like 'feminine hygiene' or 'sanitary products' in High Income Countries, because that suggests that menstruation without products is unhygienic and that you have to be feminine to menstruate. But in Low and Middle Income countries, using such terms is often an important communication strategy for making arguments for better sanitation and hygiene as part of menstrual campaigning.

Historical uses of terms like 'the curse' or 'menstrual pollution' show some of the age-old roots of menstrual stigma, but our premodern forebears were actually often less intolerant than we like to think: 'the curse', despite its alleged Biblical roots, was actually only used for menstruation from the 18th century onwards.

Menstruation and menopause researchers and activists often debate passionately about the best terms to use for our work and aims: Period poverty? Eye-catching, but sounds too negative. Period dignity? More positive, but makes it sound like menstruation without products can be undignified. Period pride? Great, but what about people for whom menstruation is a right royal pain? Peri-menopause? Technically correct, but a bit prissy.

What matters even more than terminology though is that we talk about menstruation and menopause at all: Continuous, clear communication is key.



Professor Bettina Bildhauer

Professor Bettina Bildhauer FRSE, Professor of German, School of Modern Languages, University of St Andrews

The artform of communication

Ask most people what the most direct way to communicate something to somebody is and I'm sure the answer would be "to tell them", through speech. When we break that down, it is actually a big ask which requires years of language building, a constant commitment to the learning of new words, terms, and phrases and an ability to access memory in an immediate, yet coded way. And that's all assuming you are being "told" in your mother-tongue.

Speech and communication through language have been present in homosapiens for around 135,000 years (Miyagawa et al, 2025), yet speech and/or the written word in isolation can't convey the whole sense and meaning of our communication to each other. Adding movement, gestures, and facial expressions bring to life the nuance, energy, and true intent of our communication with each other. For most, communication is a single, unified system where the spoken word and accompanying movements work together.

Think about how you use movement every day to communicate, non-verbally, how you feel towards somebody. Greeting someone with a handshake immediately indicates to the other person your perception of a relationship. If you were to end the encounter with a hug, you can likely conclude that your encounter has gone extremely well – or, if you were to start your encounter with a friendly hug and end with a handshake you might understand it's gone pretty badly.

So how might you communicate to someone something more complex; a compelling and moving story, without the need for all the codified language learning, identification of a common mother tongue or indeed, without uttering a single word? Movement is obviously a solution and, in my case specifically, dancing.

Ever since I can remember I have danced. When I was a young child, it was a way to escape into an imaginary world where I could morph into anyone, and embody any character, without the need to learn words, remember lines of a play – I could just simply *be*.

I was lucky to go to a nursery school where we danced to the 'music and movement' programme on the radio. This continued into primary school and beyond that I discovered ballet. When I think back to that early discovery, I recall it feeling like I could pause life and escape into a world of my own. In fact, to this day, I don't really have a sense of time when I'm purely in motion, which is mostly ultra marathons now rather than dancing – but I'm privileged to witness this escape daily in other people dancing in my role at Scottish Ballet.

Over the last decade Scottish Ballet has brought to life iconic literary works such as

A Streetcar Named Desire and *The Crucible*; biographic reflections like *The Scandal at Mayerling* and *Mary, Queen of Scots*; and, of course, fairy tales like *The Snow Queen* and *Cinders* – all without uttering a single word.

We are adept at communicating complex stories and eliciting deep emotional responses, and not only from our work on stage and screen.

Studies that the Scottish Ballet Health Research Committee has conducted have shown the numerous benefits of dance. A study carried out in 2020 of 174

participants with multiple sclerosis found positive effects of their motor function, in addition to psychological and social benefits.¹

Similarly a study published in 2022 analysing the effects of dance on people living with Parkinson's disease found that participants reported increased self-confidence in social situations, and increased self-efficacy in regards to living with the condition.² Our Time to Dance³ and SB Duet⁴ programmes for people living in care homes and people living with dementia have also shown positive impacts, and in time our work in this area will doubtless only deepen our understanding.

Unlocking the ability to communicate through movement for someone living with either or both conditions can be profound. The emphasis is on non-verbal communication and expression. Movement offers a powerful, alternative way for people with dementia to express themselves, feel engaged, and connect with others when verbal communication may be challenging.

With so many ways to connect and communicate with people today whether that's by video calls, phone calls, or through social media; let's not forget to dance. Remember, anyone can move and be moved.



Christopher Hampson

Christopher Hampson FRSE, CEO and Artistic Director of Scottish Ballet

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^{1,2,3,4} <https://scottishballet.co.uk/research-and-evaluation/dance-health-research/?v=66e45c44d42cb>

Leaders in their fields awarded prestigious RSE Medals

A range of esteemed academics were awarded their Royal Society of Edinburgh Medals this year, with a ceremony taking place on Wednesday, 19 November.

RSE President Sir Anton Muscatelli PRSE said: “The RSE Medals are a prestigious accolade in the world of academic excellence. Nominated by the cohort of RSE Fellows, each of the winners represents the best in their own fields. I would like to congratulate every one of them on behalf of the entire institution.”

The Lord Kelvin Medal

The Lord Kelvin Medal is awarded to Professor Jonathan Cooper, Wolfson Chair of Biomedical Engineering, University of Glasgow, for his original contribution to research and innovation in disease diagnostics, exemplified by his publications in top journals, his portfolio of IP and spin-out companies, and commitment to delivering low-cost solutions for diagnostics and monitoring of diseases in East Africa.

Professor Cooper said: “Working at the interface between engineering and medicine requires inputs from many individuals and teams, and this award is testament to a collective pursuit of knowledge, innovation, and impact. The legacy of Lord Kelvin, not just in basic science but also in instrumentation, makes this award particularly meaningful – in recognition of our work in measuring, and recording changes in the prevalence of disease in humans and animals. I am truly grateful to the Society and the selection committee for this medal.”

The Sir James Black Medals

The RSE awarded two Sir James Black Medals this year to Professor Andrew Baker, Head of Centre for Cardiovascular Science, University of Edinburgh, and Professor Stuart Ralston, Versus Arthritis Chair of Rheumatology, University of Edinburgh.

Professor Baker is a leading figure in cardiovascular research, renowned for his transformative contributions to gene therapy,

regenerative medicine, and the treatment of heart disease.

Professor Baker said: “I am humbled to accept this award that reflects upon the excellent work of my team and collaborators over many years. These strategies have enabled

us to collectively develop novel therapeutics to treat patients with cardiovascular diseases, where unmet clinical need remains a major healthcare burden.

“I would like to thank the British

Heart Foundation,

Medical Research Council and the European Union for funding that has allowed me to bridge fundamental discovery science to the clinic.

Especially important have been the wonderful environments that allowed my research to flourish at both the University of Glasgow and then more recently at the University of Edinburgh.”

Professor Ralston’s research in bone and joint disease has benefited patients and influenced policy. His contributions to medical education have reached thousands of students globally.

Professor Ralston said: “I am honoured to accept this award on behalf of my current research team at the University of Edinburgh and other collaborators that I’ve worked with over the past four decades. I would like to acknowledge the funding I’ve received from Versus Arthritis, the NIHR, the European Research Council, and the Royal Osteoporosis Society, which has supported the programmes of research that I have been involved with to gain greater understanding of the causes of bone disease and to optimise treatment strategies.”

The Adam Smith Medal

The RSE Adam Smith Medal is awarded to Professor Marcel Jaspars, Professor of

Organic Chemistry, University of Aberdeen, for his world-leading and impactful expertise in marine biodiscovery. Academically, his work in biochemistry and possible applications for drug discovery has had a huge impact.

Professor Jaspars said:

“I am delighted to have been awarded the RSE’s Adam Smith Medal in recognition of my work translating the science of marine biodiscovery into policy. I am hopeful that a scientifically literate policy to protect the biodiversity of areas beyond national jurisdiction will protect the ocean and marine scientific research.

“The deep ocean is a remarkable place, full of unexplored biology and chemistry which deserves

our protection in its own right, as well as for its potential to enable the discovery of new medicines and other products.”

The Sir Walter Scott Medal

The RSE Sir Walter Scott Medal is awarded to Professor Robert Dunbar, Professor of Celtic, University of Edinburgh, for his international role in furthering policies relating to the promotion and legal protection of minority languages, his prominent and long-standing contribution to the support and development of Scottish Gaelic language and policy in this country, and high-quality research in the area of Gaelic literature and culture generally.

Professor Dunbar said: “I am most grateful to the Royal Society of Edinburgh for this recognition, not only of my own work but of the importance of the Gaelic language and culture, and of linguistic and cultural diversity more generally, both in Scotland and in Europe.

“My efforts would not have been possible without the outstanding work of many others,



RSE President Sir Anton Muscatelli



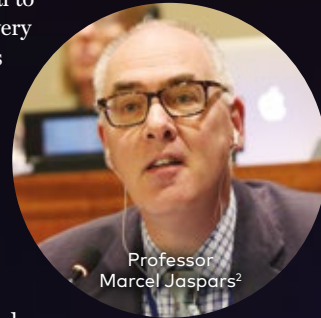
Professor Andrew Baker¹



Professor Stuart Ralston

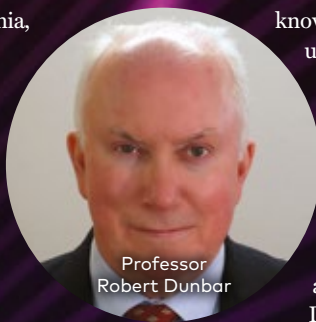


Professor Jonathan Cooper



Professor Marcel Jaspars²

both within and outside academia, from whom I have learned and with whom I have engaged and collaborated. My work would also not have been possible without the support of my university colleagues and the love and support of friends and family. For this, I am also profoundly grateful.”



Professor Robert Dunbar

The Dame Muriel Spark Medal

The RSE Dame Muriel Spark Medal is awarded to Dr Catriona McMillan, Lecturer in Medical Law and Ethics, University of Edinburgh, for her pioneering research in medical law and ethics, and specifically in the field of ‘femtech’. Dr McMillan now works on the legal regulation and ethical issues relating to the growing field of products and services that support women’s health and wellness.

Dr McMillan said: “It is a profound honour to be awarded the Dame Muriel Spark Medal, named after an exceptional author whose unique exploration of independence and individualism in women, often in an accessible and light-hearted way, has had a lasting impact on so many. I am also immensely grateful for the support of my colleagues at Edinburgh Law School and beyond, without whom this achievement would not have been possible.”

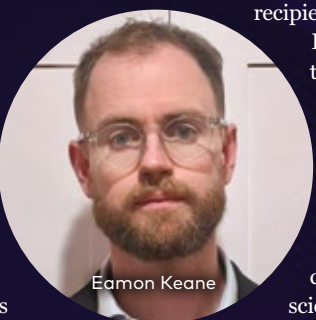


Dr Catriona McMillan³

The June Almeida Medal

The RSE June Almeida Medal is awarded to Mr Eamon Keane, Lecturer in Evidence and Criminal Procedure, University of Glasgow, for his work in improving legal responses to sexual violence, both in the provision of support to complainers in sexual offence cases and in influencing law reform.

Mr Keane said: “My work as both an academic and a practising solicitor has been supported by far too many generous colleagues over the years to mention. I want to acknowledge that much of my work is only possible due to the bravery and fortitude of victims and survivors of sexual offences themselves. As a lawyer, it’s my privilege to be able to use the law to try and give a sense of agency to those so often robbed of it. I am very grateful to the Royal Society of Edinburgh for acknowledging my work.”



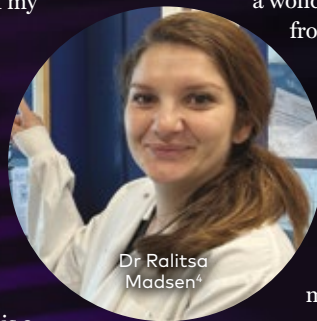
Eamon Keane

The Dame Anne McLaren Medal

The RSE Dame Anne McLaren Medal is awarded to Dr Ralitsa Madsen, Principal Investigator, Round 8 Future Leaders Fellow, University of Dundee, for her advancing

knowledge in the quantitative understanding of the growth-promoting phosphoinositide 3-kinase (PI3K) signalling pathway, and her endeavour of making knowledge accessible and useful through public and patient involvement in research activities.

Dr Madsen said: “This recognition would not have been possible without the support of my mentors, students, and family along the way – I am deeply grateful to them all. I hope this recognition will also inspire many other early-career researchers to pursue science with passion, with high integrity, and with a commitment to public benefit. For me personally, it is a huge motivation to keep pursuing my mission to crack the quantitative and highly context-dependent PI3K signalling ‘code’ in health and disease.”



Dr Ralitsa Madsen⁴

The Lady Margaret Moir Medals

The RSE awarded two Lady Margaret Moir Medals this year to Dr Christopher Berry, Senior Lecturer in Physics & Astronomy, University of Glasgow, and to Dr Audrey Repetti, Associate Professor, Heriot-Watt University.

Dr Berry’s commitment to public outreach and science communication, his leadership and service for the gravitational wave community in Scotland, the UK and internationally, and his mentorship of students, have proven Dr Berry a deserving recipient of this medal.

Dr Berry said: “I am delighted to be recognised with this award. I am fortunate to be working in gravitational-wave astronomy as we are making such exciting discoveries – breakthroughs that are only possible thanks to the collaboration of many dedicated scientists across the world, and the vision of science councils willing to invest over many decades. It has been wonderfully exciting to make these first observations of coalescing black holes and neutron stars, and I am looking forward to many more discoveries to come as we continue to search.”

Dr Repetti’s contributions to non-convex optimisation and machine learning theory for computational imaging,



Dr Christopher Berry⁵

leading to the creation of algorithmic structures and hypothesis testing tools, have produced far-reaching impact in medical and astronomical imaging.

Dr Repetti said: “I am very grateful to the RSE for this recognition. Mathematical imaging is an interdisciplinary field offering a wonderful playground to evolve from theory to applications.

I have been very lucky to meet and work with great people in the last decade, familiarising me with real-world imaging challenges as a mathematician, and motivating me to build tailored optimisation and machine learning methods.”



Dr Audrey Repetti

The Mary Somerville Medal

The RSE Mary Somerville Medal is awarded to the Leverhulme Research Centre for Forensic Science for its collaborative endeavour to develop trusted relationships between practitioners across the justice system and members of the public through ongoing public engagement and science communication.

Director of the Leverhulme Research Centre for Forensic Science, Professor Niamh Nic Daeid FRSE, said: “I am enormously proud that the Leverhulme Research Centre for Forensic Science has been selected to receive this award, and it is a testament to the continuous and exceptional achievements of all of the LRCFS staff and researchers.

“Our underlying mission is to unite the justice community, bringing science and law together, to ensure that robust science underpins the forensic evidence used and communicated in our courts. We can only do that through engaging with the public and with our multiple communities of practice across Scotland, the UK, and globally, and are enormously grateful for their trust and partnership in our work together.”



Professor Niamh Nic Daeid⁶

Image credits:

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Coast to coast

Two decades of collaboration

The 8th Scotland-Norway Waves & Marine Hydrodynamics Symposium was held at the Royal Society of Edinburgh on 22 and 23 October this year.

The two-day event was the continuation of a strong and growing relationship between academics in Scotland and Norway that began in 2005 with the signing of an agreement between the RSE and the Norwegian Academy of Science and Letters (DNVA).

The purpose of that agreement is to promote and fund research activity which supports increased collaboration between the national academies of the two countries. Since their inception, the Wave Symposia have continued to grow, fostering relationships between international researchers within Scotland and Norway.

Professor Peter Davies FRSE is Emeritus Professor of Fluid Dynamics at the University of Dundee. He said: “There is a lot of research activity between Scotland and Norway looking at the same kind of problems in water waves. We have kept the symposia going since the first one in 2008 and a lot more Scottish universities have become involved, as have Norwegian institutions.”

As many of the researchers explained in their own presentations, our understanding of

the behaviour of waves and the seas, especially as they interact either with one another, or with different environmental factors such as different seafloors, and how they change with conditions, is growing all the time.

This partnership is critical to this expanding horizon. The presentations show the field of waves and hydrodynamics as it is, up to the minute. It is science being done at the edge of our understanding of the problems being studied.

Ricardo Barros of Loughborough University said: “The first time this was organised in 2008 it was strictly on internal waves in the ocean, and that is my area. Now they have branched out, so, for example, there was a whole section on how autonomous vehicles can be used in research.

“THE SYMPOSIA ARE A MELTING POT OF DIFFERENT IDEAS, DRAWING IN RESEARCHERS FROM ACROSS THE ATLANTIC”

“Peter Davies and John Grue are leading experts, and thanks to them many people were trained to follow their steps: some of them became academics, and many of them are here at this symposium.”

The symposia are a melting pot of different ideas, drawing in researchers from across the Atlantic.

Peter Diamessis, Professor of Civil and Environmental Engineering at Cornell University, said: “I grew up in Greece so it is nice to come and work with European colleagues because it is a refreshing perspective. Here there are field-going oceanographers and more basic fluid mechanics folk, and I get some new perspectives here.”

He added that what typifies the symposia is the mix of both basic and applied science, the combination of which can lead to the better development of practical tools to be used in the field.



The symposium attracts researchers from around the world
©Stewart Attwood Photography

The symposia also serve as their own ecosystem for researchers to grow. Presentations frequently displayed a vast array of researchers who were at varying stages of their careers, with an emphasis on the post-doctoral stage. The invitation of new perspectives plays a vital role.

Professor John Grue, of the University of Oslo's Department of Mathematics, said: “Many of the presentations we have seen show the importance of having post-doctoral researchers involved in these research projects.

“As people come up through university and then finish their Masters and then PhDs, they have so many new ideas and new ways of tackling problems – and there are always new problems and new things to find out.”

On day two of the gathering, Michela De Dominicis, Senior Scientist at the National Oceanography Centre in the UK, presented her latest findings and was eager to hear what people thought.

She said: “In my case I am showing numerical simulations and some new results that I have an interpretation about but it is good to have some external opinions because I might not have picked up on some things that other people have, or maybe they have encountered some similar things – because if I just stay in my office I might not find out.

“Science is done by collaborating with other people, not just by sitting in an office.”

It is for precisely this reason that the symposium was set up, and for this reason it continues. The United Nations estimates that more than 80% of global trade is conducted by sea, and the seas cover 70% of the Earth's surface. Their continued study is crucial to our understanding, and these symposia are a vital component of that study.



Professor Peter Davies FRSE opening the symposium ©Stewart Attwood Photography



A year in review

The RSE published its *Year in Review* in October this year, covering the breadth of activity undertaken from 2024-25.

Through its public engagement activities, the RSE was able to welcome 4,600 people to events, both in the RSE itself, online and elsewhere across Scotland, between the *Curious Festival* and the vast array of other talks, workshops, and roundtable events.

As the Secretariat for the UK & Ireland Human Rights Committee, the RSE continued to defend human rights and academic freedom. In that role the RSE developed new terms of reference and ways of working, which were agreed with the eight UK Academies, streamlining processes and reducing the response time to each case alert. The Society also developed guiding principles to facilitate decision making, and responded to four international and high-profile case alerts, helping to increase pressure on oppressors of academic freedom to act.

In its policy work, the Society submitted 11 responses to national consultations and inquiries on a range of themes, including managing Scotland's public finances, the Land Reform (Scotland) Bill, and the Route Map to 2030 for circular economy and waste. These were frequently fed into parliamentary debates leading to numerous cross-party mentions and actions sparked by the RSE's insights. The RSE also hosted its inaugural Westminster networking event, engaging MPs and demonstrating the Society's role in tackling key societal challenges.

The Research Awards Programme continues to enhance Scotland's standing as a leader in research and innovation. By addressing a key gap in the nation's funding landscape, it provides seed funding across all disciplines and career stages. The awards offered by the Society complement larger UK-wide research and innovation grants, particularly benefiting early career researchers and those requiring smaller grants. Through initiatives such as Personal Research Fellowships, Research Collaboration Grants, Small Research Grants, International Joint Projects, and Bilateral Visits, the programme enables Scotland's dynamic research community for the benefit of society, both locally and globally.

In 2024-2025, the RSE assessed more than 700 applications from 18 Scottish higher education institutions, awarding over 100 grants worth a total of £1.38 million. This funding made it easier for researchers to develop their ideas with enhanced scope and efficiency. A robust peer-review process, involving Fellows and members of YAS, upheld the highest standard of attainment across all career stages. Collaboration continues to be the byword for research awards, with 67 institutions engaged nationally and internationally, broadening researcher connections across sectors and industries. Additionally, the RSE successfully leveraged more than £100,000 in additional funding to enhance existing programmes and £160,000 to launch new initiatives.

You can read the full *Year in Review* here:
rse.org.uk/rse-publishes-year-in-review-2024-2025



Royal Society of Edinburgh (RSE), Young Academy of Scotland (YAS), Council for At-Risk Academics (CARA), and Institute for Advanced Studies in the Humanities at the University of Edinburgh (IASH) event



The Wandering Womb – a creation of University of Edinburgh PhD student Francesca Hearn-Yeates – was part of the 2024 *Curious festival*



Journalist David Pratt delivers the sold-out McCormick Lecture on *Journalism in today's wartime Europe*



Dr Danying Yang, Heriot-Watt University, RSE Small Research Grant recipient

Remembering the Edinburgh Conversations – an appeal to conversation and reciprocity

More than 40 years ago, a small group of military officials from the United States and the Soviet Union were brought together by a team of trusted academics at the University of Edinburgh. Meeting in secret at the height of the Cold War, these dialogues later became known as the Edinburgh Conversations.

Aimed at thawing relations between the world's leading nuclear powers, core elements of the Edinburgh Conversations were "open dialogue, continuity of contact, reciprocity of visits, social events and free and frank exchange of ideas".¹

Fast forward to 2025, the need for open dialogue across deep divisions is stark. We live in an age of escalating armed conflict: "Since 2010, the number of conflicts involving states has almost doubled".² Beyond this statistic are experiences of unimaginable horror: reproductive genocide of Palestinians in Gaza, aerial bombardment of schools in Ukraine, massacres of ethnic minorities in Sudan, and conflict-related sexual violence against civilians in Myanmar.

In the face of this horror, it is easy to assume that initiatives like the Edinburgh Conversations are a relic of the past. However, research from the Peace and Conflict Resolution Evidence Platform (PeaceRep), led by Edinburgh Law School, shows that mediation and peacemaking efforts continue to bring opposing sides together in even the most violent and supposedly intractable contemporary conflicts.³

These peacemaking efforts face enormous challenges to even get parties to talk, requiring that armed groups trust in the seriousness of a process, and its ability to deliver dividends.⁴ Confidence-building

measures are one way that mediators try to develop trust in early stages of peace talks, through mechanisms such as prisoner exchanges and security guarantees. Symbolic, inter-personal actions can also build trust between enemies, such as handshakes or shared meals.

Careful consideration of how opposing parties talk to each other also matters. Timing, inclusion criteria, secrecy, and objective-setting have been a key part of designing peace processes since the 1990s. Such technocratic choices now intersect with new challenges, such as the ability of digital technologies to support – or undermine – a dialogue, and the difficulties of working in a congested and diverse peacemaking space, where multiple interested states jostle for influence.

As mediation orthodoxies struggle to adapt to fragmented and messy conflict realities, there are still some back-to-basics approaches that can open space for conversation. For example, referring to a humanitarian 'pause' instead of a ceasefire, even if parties have essentially agreed to stop using force, was a creative naming technique used in early peace talks between the Government of Indonesia and the Free Aceh Movement.⁵

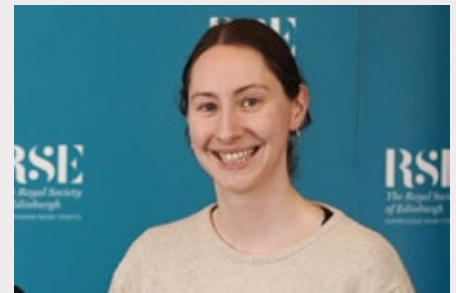
Bringing diverse groups of people together in neutral spaces to talk can also maintain energy behind the idea of dialogue at times when formal processes have stalled or failed. Through PeaceRep, researchers from the Universities of Stirling and Edinburgh convened a series of 'Study Group' meetings between civil society, ethnic resistance movements, People's Defence Forces, scholars and practitioners from Myanmar. These conversations have created a space for groups and individuals to "discuss emerging themes in the political space in Myanmar", and have helped to build relationships between actors with diverse perspectives on the conflicts, in a moment when there is little

prospect of a formal peace process between the military junta and opposition groups.

The peacemakers of today are facing difficult choices within an unenviable funding environment. But the Edinburgh Conversations of the Cold War show us the enduring value of the "free and frank exchange of ideas". As Western governments invest in military solutions to what are political problems, we urgently need to make the case for supporting sustainable peacemaking efforts, and persevere in pursuing dialogue across divides.

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Laura Wise, Senior Research Fellow,
University of Edinburgh and PeaceRep
programme coordinator



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