



NCI Research Day 6th edition

Thursday 12th of June 2025

9:00 am – 14:15 pm Executive 1



Agenda: NCI Research Day 2025

Thursday 12th June 2025, Executive 1, National College of Ireland

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09:00 - 09:05	Welcome Introduction
00.05 00.15	Malaama Gaaaah
09:05 - 09:15	weicome speecn Prof Gina Quin (President, National College of Ireland)
09.15 - 09.20	Enhancing Research Visibility and Impact: Reimagining the Research Website
05.15 05.20	Prof Paul Stynes (Dean School of Computing), Conor Sisk (Marketing)
09:20 - 09:30	Open research dissemination through NCI-owned channels
	Sam Cogan (Teaching Enhancement & Digital Learning)
09:30 - 10:00	Keynote: Fairness in Machine Learning: Why, How, and What's Next?
	Dr Simon Caton (School of Computer Science, University College Dublin)
10:00 - 10:15	An exploratory study: The influence of a professional non-family accountant within a family
	firm and the impact on institutional logics
	Theresa Mulcahy (School of Business and Humanities)
10:15 – 10:30	A study on the role of machine learning in the financial services industry, specifically in the
	mutual fund sector
	Dr Rakesh Kondamuri (School of Business and Humanities)
10:30 - 10:45	Home visitors participatory research
	Michelle Moore, Lisa Farrelly, Melanie Cassidy, Lisa Miao, Maria Cannon, Anca Oltean, Dana (Qi)
	Wang, Deirdre McCarthy (Early Learning Initiative; Equality, Diversity and Inclusion)
10:45 - 11:00	Mathematics and AI for "Smart" Living
	Dr Amit K. Chattopadhyay (School of Business and Humanities)
11:00 - 11:15	Participatory research on parental attitudes towards STEM in Ireland
	Nikki Ryan, Kate Darmody, Dr David Mothersill, Dr Anu Sahni, Fabián Armendáriz, Brigina
	O'Riordan, Prof Josephine Bleach, Prof Paul Stynes (School of Business and Humanities; School of
	Computing; Early Learning Initiative)
11:15 – 11:30	Coffee Break
<i>11:15 – 11:30</i> 11:30 – 11:45	Coffee Break Explainable AI for efficient and transparent network traffic classification techniques
<u>11:15 - 11:30</u> 11:30 - 11:45	Coffee Break Explainable AI for efficient and transparent network traffic classification techniques Dr Mosab Hamdan (School of Computing)
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Speakers

Keynote Speaker: Dr Simon Caton School of Computer Science, University College Dublin



Title: Fairness in Machine Learning: Why, How, and What's Next?

Abstract:

When Machine Learning technologies are used in contexts that affect citizens companies as well as researchers need to be confident that there will not be any unexpected social implications such as bias towards gender, ethnicity and/or people with disabilities. There is significant literature on approaches to mitigate bias and promote fairness yet the area is complex and hard to penetrate for newcomers to the domain. This talk will provide an introduction to what it means for machine learning to be (un)fair, and the different schools of thought and approaches that aim to increase the fairness of Machine Learning. We'll touch on a few dilemmas for fairness in machine learning research, and comment on some of the future directions.

Biography:

Dr Simon Caton is an Assistant Professor of Computer Science at University College Dublin (UCD) where he is one of the founding members of the UCD Centre for Quantum Engineering Science and Technology (C-QuEST). His main research area is the applications of machine learning and optimisation for and with quantum computing. Where key examples are: quantum machine learning reinforcement learning to control quantum systems and in the design and application of quantum optimisation methods. He also works in the area of fairness in machine learning applications towards building more ethical AI applications. Prior to joining UCD he was a lecturer of data analytics at the National College of Ireland and a PostDoctoral researcher at Karlsruhe Institute of Technology.

Theresa Mulcahy School of Business & Humanities



Title: An Exploratory Study: The Influence of a Professional Non-Family Accountant within a Family Firm and the Impact on Institutional Logics

Abstract:

Family firms are unique organisations that manage the co-existence of both family values and firm values aimed at ensuring a viable business with positive financial results. Values have been commonly linked to institutional logics, the values, and norms of actors in an organisational setting. The objective of this research is to explore the influence of professional non-family accountants, in a senior management position, within the family firm and the impact on institutional logics. Exploring these interactions will provide an insight into how and why some logics compete while other logics display actions and purpose that complement each other.

A case study approach was deemed the most suitable to answer the research questions. Case study research attempts to capture the perspectives of different participants and focuses on how their different meanings illuminate the topic. This is particularly relevant in capturing institutional logics as actors reveal and interpret institutional logics in diverse ways. Cases will be family firms ("case firms) and data collection will be in the form of interviews and documentary evidence. Interviews will take place with family members (at senior management level) and professional non-family accountants who are working in the family firm at senior management level.

Biography:

Theresa Mulcahy is an Accounting Lecturer and Programme Director at the National College of Ireland. She holds a BSc Honours degree in Accounting from Queens University Belfast and an MBS in Accounting from Dublin City University. Theresa qualified as a Chartered Accountant with PricewaterhouseCoopers where she worked as a Manager in Audit and Advisory Services.

Theresa is currently studying for her PhD at the South East Technological University, Waterford, under the supervision of Dr Collette Kirwan and Prof Sheila O'Donohoe. She is currently at data analysis stage and is working on data from 5 case studies (family firms). Her research examines institutional logics in family firms particularly in the context of a non-family professional accountant entering the family firm. Theresa has presented her research at a number of doctoral seminars including the British Accounting and Finance Association (BAFA) and the Irish Accounting and Finance Association (IAFA). **Dr Rakesh Kondamuri** School of Business & Humanities



Title: A study on the role of machine learning in the financial services industry, especially in the mutual fund sector

Abstract:

This study aims to evaluate the performance of the mutual fund industry by analysing top-performing funds and examining investor attitudes toward key factors influencing mutual fund returns. Alongside this, the research compares the predictive capabilities of various machine learning (ML) models— Logistic Regression, Random Forest, Gradient Boosting, Support Vector Machine (SVM), and K-Nearest Neighbor (KNN)—to identify individuals likely to invest in mutual funds based on demographic and financial attributes. Cost-profit analysis and categorisation indicators were employed to assess the financial viability of these models. Results indicate that KNN, with a recall of 0.71 and a net profit of \$34,000, is the most cost-effective model, whereas Random Forest, despite strong predictive ability, incurred higher monetary losses due to misclassification. Gradient boosting was found to be the least effective overall. The findings highlight the potential of integrating machine learning with behavioural insights to enhance both mutual fund performance evaluation and investor classification. Future research will focus on developing more refined predictive models by incorporating real-time investor sentiment and advanced AI techniques.

Biography:

Dr. Rakesh Kondamuri is a finance academic with over 15 years of national and international teaching and research experience across India and Ireland. He currently serves as a Lecturer at the National College of Ireland, where he plays an active role in curriculum development, academic quality assurance, and industry integration. With a PhD in Finance and an MSc in Business Analytics from Dublin Business School, Dr. Rakesh brings a unique interdisciplinary approach to his teaching and research. His academic contributions span FinTech, behavioural finance, and sustainable finance, and he is known for blending theoretical insights with real-world applications. Currently, Dr. Rakesh is exploring modern research techniques, with a strong focus on machine learning applications in finance. His recent working papers investigate investor decision-making using PCA, clustering, and supervised learning models. He is also developing case studies based on financial performance to support experiential learning in classrooms. In line with advancing his data-driven research agenda, he actively uses data visualization tools like Tableau and Power BI to extract insights and communicate complex patterns effectively. He has presented at leading global conferences including IIMs, IIT Madras, and the National University of Singapore, and has successfully secured research grants for statistical modelling initiatives. As a dynamic and evolving researcher, Dr. Rakesh continues to contribute meaningfully to both academic scholarship and pedagogical innovation.

Michelle Moore, Lisa Farrelly, Melanie Cassidy, Lisa Miao, Maria Cannon, Anca Oltean, Dana (Qi) Wang, Deirdre McCarthy



Early Learning Initiative; Equality, Diversity and Inclusion)

Title: Home visitors participatory research

Abstract:

ELI has a team of Home Visitors, who for 18 years have provided early years education in the homes of families. Many families visited are vulnerable for a variety of socio-economic, inclusive of exclusion in relation to health and education factors. Several of the team were parents on the programme, before being employed as Home Visitors. They have become educational ambassadors, playing a crucial role in shaping the educational landscape in their communities.

Home Visitors, often early school leavers, engage in CPD and accredited courses as well as being giving opportunities for career progression. Anecdotally Home Visitors have commented on the impact of their own involvement as Home Visitors on their own education and their children's education. This project, which is a partnership between ELI and EDI, aims to explore the impact of the educational trajectories on our home visiting staff and their families using a community action research methodology.

The model of research will be participatory, ensuring that those who the subject of study is core to gathering the data of the study, and involved in the dissemination of the results. This research is currently underway; the research team have received training and are now doing the fieldwork.

Biography:

This research is being developed in partnership between Equality, Diversity and Inclusion and the Early Learning Initiatives in NCI, an action which was identified in <u>NCI's Athena Swan Action Plan</u>.

The research team is made up of Home Visitors who work in ELI within NCI, the ParentChild+ National Support Coordinator, the National Home Visiting Manager, and the Equality, Diversity and Inclusion, and Training Manager.

Home Visitors are a diverse team of trained early years professionals who bring a wealth of experience of working with young children and families in the family home in Inner City Dublin, which is also the community in which they live. Many have backgrounds in early childhood education and family support and reflect the cultural and linguistic diversity of the communities they serve. Their role is to build trusting relationships with families, delivering high-quality, play-based learning experiences that support children's development and strengthen parental engagement.

The team of home visitors are carrying out the field work of the research, the research training was provided by Deirdre McCarthy and the research team are supported by Lisa Farrelly and Michelle Moore.



Title: Mathematics and AI for "Smart" Living

Abstract:

This talk explores the transformative role of mathematics and Artificial Intelligence in addressing critical societal challenges, presented in two distinct sections. The first section, "Poverty Through the AI Lens," revisits historical approaches to understanding poverty, from Engel's unorthodox 19thcentury data-centric profiling of consumption patterns to the later development of poverty lines by Sen and Atkinson. It then highlights the emergence of the "dynamical" Chattopadhyay-Krishna Kumar-Mallick (CKM) model around 2010, which employed stochastic mathematics to model market exchange populations The significant in with no savings. breakthrough (https://doi.org/10.1038/s41467-020-20201-4) lies in the recent application of Artificial Intelligence to analyse this model, achieving unprecedented near-to-perfect predictions for poverty lines in developing nations, showcasing a visionary approach with major policy implications. The second section, "Infection Epidemiology Through the AI Lens – Digital Healthcare," delves into applications from probabilistic mathematics, implemented through Machine and Deep Learning, towards predicting the role of vaccines (when COVID-19 vaccines were still not available) in containing COVID-19 infection from an AI-powered mathematical model (https://doi.org/10.1038/s41598-021-90698-2). This section outlines key results demonstrating unprecedented accuracy in predicting daily mortality profiles across 18 countries over approximately 4.5 months. The two sections combined underscore the seamless extensibility of AI-enhanced mathematical approach towards smart living.

Biography:

Trained as a Theoretical Physicist and repurposed as an Applied Mathematician and Modeller, Dr Amit Chattopadhyay has over 25 years' experience in leading cutting-edge interdisciplinary research in the UK, Germany, Italy and India. Amit joined the NCI in January 2025 following 15 years at Aston University, UK as a Reader in Applied Mathematics. He is a stochastic modeller and statistical physicist who specialises in AI-driven real-life centric interdisciplinary modelling across biology, clinical science, supply chains, low-carbon sustainability, econometrics, and nanoengineering. As the first non-European Marie Curie physicist and formerly a Humboldtian, Amit has co-authored 80 peer-reviewed publications (53 in Q1 journals, including Nature, PIOS, APS), generated over £10 million in competitive research grants, supervised 7 PhDs, and complemented his research success with editorship roles in the Nature and Frontiers groups. Amit has substantial experience in industrial research with groundbreaking contributions in drug repurposing (MRSA), clinical diagnostics (CVD, Dengue) and progression (Glaucoma, Cancer). He has the credit of the first landmark AI application in developmental economics, target-specific ray/chemo therapy, COVID-19 foretelling, heart-attack prediction, and MRSA antibiotic development. Amit is also a Senior Fellow of the Higher Education Academy (SFHEA) and a Fellow of the Institute of Mathematics (FIMA). Further information available at LinkedIn and Google Scholar.

Nikki Ryan, Dr David Mothersill, Kate Darmody, Dr Anu Sahni, Fabian Armendariz, Brigina O'Riordan, Prof Josephine Bleach, Prof Paul Stynes



School of Business & Humanities; School of Computing; Early Learning Initiative; Equality, Diversity and Inclusion)

Title: Participatory research on parental attitudes towards STEM in Ireland

Abstract:

Early learning of science, technology, engineering, and mathematics (STEM) is a strong predictor of a child's future success. Parents play a critical role. Parents can build confidence and self-efficacy in these subjects, which helps increase a child's motivation and career interest, and the effort they put into learning these often challenging subjects. However, many parents living in disadvantaged communities, such as Dublin's North East Inner City (NEIC), experience low confidence and self-efficacy in STEM themselves. The Early Learning Initiative run several programmes for the NEIC community that have proven effective at boosting STEM competencies in parents and young people, but more evidence-based knowledge is needed to better understand parent's perspectives, especially during a time of such rapid change due to artificial intelligence. This presentation will discuss ongoing participatory research on parental attitudes and awareness of STEM, including results from a survey distributed to 157 parents, and semi-structured interviews with ten parents. Parents understand the value of STEM for their children's education and future career success, but they are also intimidated by these subjects. Our research will directly inform new programmes that aim to increase access to STEM for learners in the local community.

Biographies:

Nikki is originally from the UK where she attended Goldsmiths College, University of London and graduated with a BA in French. She relocated to San Francisco, CA, USA in 2005, where she obtained her Master's in Library and Information Science. Her most recent relocation was to Dublin, Ireland where she now works as a Researcher for the Early Learning Initiative (ELI) at the National College of Ireland. Her work is focused on evaluating the delivery of STEM programming in the community and the longitudinal impact of home visiting programs at the ELI, including the ParentChild+ and Stretch Graduate Programs.

Dr David Mothersill is Associate Professor in Psychology and Co-Director of the Stigma and Mental Health Ireland Laboratory (SAMI) at National College of Ireland. David was awarded a PhD from Trinity College Dublin in 2014 and went on to lecture in the University of Galway, where he co-developed the successful MSc in Clinical Neuroscience in 2016. David's research uses neuroimaging and cognitive testing to better understand cognitive difficulties in schizophrenia. This research has led to 51 peer-reviewed papers published in the top scientific journals in the world, including Nature (impact factor 50.5), and over €227,000 in grant funding from Research Ireland, Royal Irish Academy, Esther Ireland, and the Irish Global Health Network. David has presented this research at conferences around the world, including Kyoto, Japan, and Oxford University, and on RTÉ One and Ireland AM. David's first app, cTOM, a test to measure social cognition, was released on the Apple App Store in 2022. Further information available at https://orcid.org/0000-0003-3013-4088



Title: Explainable AI for efficient and transparent network traffic classification techniques

Abstract:

Accurate traffic classification is essential for quality-of-service management, intrusion detection, and anomaly monitoring across diverse infrastructures, including Software-Defined Networks (SDN), Internet of Things (IoT) deployments, and edge-computing gateways. We propose a unified, explainable framework that delivers both efficiency and transparency without relying on heavy, hard-to-understand models. Key features include:

SDN-based Feature Selection: Using Boruta and Ensemble Weight methods at the controller to extract stable flow statistics and lighten the control-plane load.

Stream and Incremental Learning: Employing Hoeffding Adaptive Trees, Adaptive Random Forests, and k-NN with sliding windows to handle concept drift and continuous data streams.

Edge-Optimized Models: Leveraging depthwise separable convolutional networks and compact transformer encoders for real-time inference on resource-limited gateways.

Tiered Anomaly Detection: Splitting intrusion-detection tasks between edge and fog layers to balance latency, memory use, and detection accuracy.

Explainable AI (XAI): Integrating LIME and SHAP to provide both local (instance-level) and global (model-level) explanations for every decision, building operator trust and enabling targeted tuning.

By combining SDN orchestration, lightweight edge architectures, and explainability, our framework delivers scalable, transparent, and responsive traffic classification across modern network environments.

Biography:

Dr Mosab Hamdan (Senior Member, IEEE) received the B.Sc. degree in computer and electronic systems engineering from the University of Science and Technology (UST), Omdurman, Sudan, in 2010, the M.Sc. degree in computer architecture and networking from the University of Khartoum, Khartoum, Sudan, in 2014, and the Ph.D. degree in electrical engineering (computer networks) from Universiti Teknologi Malaysia (UTM), Johor Bahru, Malaysia, in 2021. From 2010 to 2015, he was a Teaching Assistant and Lecturer with the Department of Computer and Electronic Systems Engineering, UST. He was a Research Fellow with several esteemed institutions, including UTM, Universiti Malaysia Sabah, Kota Kinabalu, Malaysia, University of São Paulo, São Paulo, Brazil, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, and South East Technological University. He is currently an Assistant Professor with the School of Computing, National College of Ireland, Dublin, Ireland. His main research interests include computer networks, network security, software-defined networking, the Internet of Things, smart cities, intelligent transportation systems, and future networks.

Dr Jorge Mario Cortes-Mendoza

School of Computing



Title: Privacy-preserving logistic regression for federated learning environments with a policy to reduce the training time

Abstract:

Logistic Regression (LR) is a widely used statistical model for classification problems. However, its training and evaluation in a shared environment increase the possibility of information leaking. A Federated Learning (FL) approach for the LR (FL-LR) eliminates security issues by using only locally available data for training. In an FL environment, the FL-LR model receives the coefficients of local models to create the general model, which is then distributed to update the local models. The exchange process does not leak confidential information when LR coefficients are encrypted using Homomorphic Encryption (HE), which allows the merging of local LR models with privacy preservation. This work presents two versions of FL-LR and a novel training policy that reduces the training time, with only slightly decreased quality, in an FL environment with HE. In this presentation, we describe the main characteristics of the FL-LR models that exchange the LR coefficients in a privacy-preserving manner and analyze the accuracy and time of the reduction policy, which progressively reduces the training data.

Biography:

Dr Jorge Mario Cortes-Mendoza received his bachelor's degree in computer science from the Autonomous University of Puebla (BUAP) in 2008 and his master's degree and PhD in Computer Science from the CICESE Research Center in 2011 and 2018, respectively. He carried out research stays at the Georg-August University in Göttingen, Germany, and the University of Luxembourg, Luxembourg. He was a postdoctoral researcher at South Ural State University (SUSU) in Russia and the University of Luxembourg. He worked as an assistant professor at the Polytechnic University of Amozoc (UPAM) and the Metropolitan Polytechnic University of Puebla (UPMP) in Mexico. Also, as a visiting associate professor at the CICESE research center in Mexico. Jorge Mario Cortés-Mendoza is a postdoctoral researcher at the Cloud Competency Centre, National College of Ireland, and his main interests include cloud computing, load balancing, distributed computing, security, scheduling, and artificial intelligence.

Dr David Mothersill School of Business & Humanities



Title: Cognitive performance in patients diagnosed with NMDAR encephalitis compared to patients with schizophrenia and healthy controls

Abstract:

The N-Methyl-D-Aspartate (NMDA) receptor is an important neurotransmitter receptor in the brain that helps neurons communicate. NMDA receptor antibody-mediated encephalitis is a neurological syndrome caused by blockade of the receptor by antibodies due to an autoimmune condition or tumour. Patients may experience symptoms of psychosis, including cognitive difficulties. However, it is unclear which brain areas underly these cognitive difficulties. The aim of this study was to examine cognitive performance and neural activation during a cognitive task in 12 encephalitis patients who had received immunotherapy treatment compared to 14 patients with schizophrenia and 14 healthy controls. Cognitive performance was measured using the Wechsler memory scale and Cambridge Automated Neuropsychological Test Battery, and neural activation examined using functional magnetic resonance imaging during performance of an N-back working memory task. Large differences between groups were observed in working memory and episodic memory performance, driven by poorer performance in schizophrenia (Cohen's d = 0.766 to 1.254, p < 0.05). NMDA encephalitis patients' performance was lower than controls, but these differences were not statistically significant. No significant differences in neural activation were observed between groups. Future studies should examine neural activation in larger groups of encephalitis patients, which may have sensitivity to detect smaller effects.

Biography:

Dr David Mothersill is Associate Professor in Psychology and Co-Director of the Stigma and Mental Health Ireland Laboratory (SAMI) at National College of Ireland. David was awarded a PhD from Trinity College Dublin in 2014 and went on to lecture in the University of Galway, where he co-developed the successful MSc in Clinical Neuroscience in 2016. David's research uses neuroimaging and cognitive testing to better understand cognitive difficulties in schizophrenia. This research has led to 51 peer-reviewed papers published in the top scientific journals in the world, including Nature (impact factor 50.5), and over €227,000 in grant funding from Research Ireland, Royal Irish Academy, Esther Ireland, and the Irish Global Health Network. David has presented this research at conferences around the world, including Kyoto, Japan, and Oxford University, and on RTÉ One and Ireland AM. David's first app, cTOM, a test to measure social cognition, was released on the Apple App Store in 2022. Further information available at https://orcid.org/0000-0003-3013-4088



Title: Metadone learning system

Abstract:

Metanode is an AI-first learning and training platform designed to help companies train their teams more effectively and more efficiently. Unlike existing traditional learning systems, Metanode enables organisations to take a holistic, data-driven approach to workforce development, ensuring that training is targeted, efficient, and aligned with real business needs and ROI metrics.

In this presentation, the research team will present the overall goals of the project and how they have developed a prototype system that harnesses the power of cognitive modelling, content analysis, large language model (LLM) integration and data visualisation to create a dynamic, self-optimizing learning ecosystem.

Biographies:

Dr Michael Goldrick is an Associate Professor in National College of Ireland, Visiting Professor of Educative Technologies at Eötvös Loránd University, Research Fellow for Dublin City University. CEO and Co-Founder of Metanode. Dr Goldrick is PI on the Project and overall lead.

Dr Keith Maycock, Programme Director and Lecturer in Computer Science in the School of Computing, in National College of Ireland, Co-Founder of Metanode and Co-founder of NetSearch Platform Limited. Dr. Macycok is the Technical Lead of Metanode

Donald Clark is an Entrepreneur, professor with 38 years' experience in Learning technologies, CEO, investor, Board member (PlanB learning, LearningPool and Cogbooks), He was a founding member of Epic Group plc and the Founder and CEO of Wildfire Learning. CPO of Metanode. Prof Clark is Product lead.

Yinglian Deng: s a Full-Stack Developer at Metanode. She has 5 years experience in building usercentric solutions. Yinglian has a passion for blending creativity with usability and enjoys exploring AI technologies.

Emre Kavak, is a software developer and MSc candidate in Software Design with AI. He holds a Higher Diploma in Computing from the National College of Ireland, graduating with First Class Honours. Emre has built AI-powered systems including emotion-aware chatbots and mobile learning apps, drawing on his experience in full stack and cross-platform development. A winner of the NCI Ideathon and multiple innovation awards, he combines strong technical skills with a passion for solving real-world problems through technology.

Shudong Wang, Full stack Developer with 8 years of experience in developing efficient, scalable web solutions, he specializes in frontend infrastructure, component libraries, micro frontends, and low-code platforms.



Title: Digital technologies in Early Childhood Education and Care practice (DigiLEP in ECEC)

Abstract:

The context where young children learn and develop has changed in a fundamental way. Research has indicated that young children spend considerable number of their waking hours surrounded and interacting with digital tech. While digital and media tech offers rich opportunities for learning & education, for e g, through digital play, they also pose certain risks, such as, passively engaging with screens. Passive engagement is known to be co-related with increased health and behaviour related issues (Bonhert & Gracia, 2020 data from Growing up in Ireland). OECD (2023) reviewing recent publications related to digital technology in ECEC, highlight gaps in practice related digital knowledge and skills of Early Childhood practitioners. The aim of this research is to identify Irish ECEC educator needs, attitudes, competencies related to the use of digital technology, so as to support Irish policy development. Specifically, the project objectives of the research are to describe the current use of digital technology in everyday ECEC practice, to identify gaps in competencies and capacities using the digital competency framework. It also aims to identify attitudes and perceived challenges /benefits of using digital technology.

This presentation will showcase this funded project details and focus on the work done so far, which will include a description of the theoretical framework, research design, development of the tool and highlights emerging from the literature reviewed.

Biography:

Dr Meera Oke (Human Development/Child Development) from Mumbai, India; is a higher education academic and social scientist. Her over 40 years career spans two countries, India and Ireland. Currently, she enjoys researching, teaching and learning in her role as Associate Professor, Early Childhood Education and Care programmes at National College of Ireland (NCI), Dublin. She also serves as a board member and trustee of an NGO - Bhartiya Samaj Seva Kendra (BSSK), Pune, India, founded in 1979, for underpriveledged community education outreach, and the nurturance and care of abandoned (found), orphaned children (birth to 6 years) and their permanent placement in families of origin or in permanent adoption. Her publications, conference presentations, and research interests are in the areas of play, early childhood pedagogy, outcomes of adoption, adolescence and educator wellbeing.



Title: Advancing sustainability through green science and technology: AI, electric vehicles and energy conservation

Abstract:

Sustainability has become a global imperative due to climate change, resource depletion, and environmental degradation, largely driven by rapid industrialization and urbanization. Green science and technology-especially artificial intelligence (AI), electric vehicles (EVs), and energy conservationare central to mitigating these impacts. AI is transforming sustainability by optimizing energy use, improving climate modelling, and enhancing resource efficiency across sectors such as agriculture, where precision farming reduces water and fertilizer use, and transportation, where EVs and AI-powered smart charging cut emissions. Countries like Norway showcase the potential of EV adoption for sustainable mobility.

Urban sustainability is further advanced by AI-integrated smart grids, energy-efficient buildings, and public transit optimization. Policy measures like carbon pricing and incentives for green initiatives support these technological shifts. Additionally, promoting plant-based diets addresses emissions from livestock, which contribute significantly to global greenhouse gases.

Despite progress, challenges remain, including high costs, infrastructure gaps, and consumer resistance. Continued technological innovation and international cooperation are essential to overcoming these barriers and achieving long-term environmental sustainability. The integration of AI and green technologies, supported by proactive policies, is key to building a greener future.

Biography:

Anshu Shahdeo is a tutor at the National College of Ireland, where she teaches modules in Cloud Computing, DevOps, and Computer Architecture. Her research explores the role of artificial intelligence in promoting sustainability and innovation in education. Anshu is passionate about integrating cutting-edge technologies into the classroom and fostering inclusive, future-focused learning environments. Further information available at https://www.linkedin.com/in/anshushahdeo/.

Dr Robert Fox School of Business & Humanities



Title: Loneliness and mental health: Understanding their reciprocal and interactive nature

Abstract:

Loneliness has been consistently found to a have deleterious effects on mental health with evidence suggesting a possible bidirectional relationship with psychopathology. This study aimed to examine the longitudinal association between loneliness and internalising psychopathologies (i.e., symptoms of major depressive disorder, generalised anxiety disorder, and posttraumatic stress disorder) to determine the bidirectional/reciprocal relationship that exists between these constructs. Data consisted of four waves from the longitudinal COVID-19 psychological research consortium (C19PRC) study, a nationally representative sample of the adult general population in the United Kingdom (n = 5,946) collected between March 2020 and July 2022. The longitudinal associations between loneliness and internalising psychopathologies (symptoms of major depressive disorder, generalised anxiety disorder, and posttraumatic stress disorder) were examined using Random Intercept Cross-Lagged Panel Models. Strong trait-like associations were found between loneliness and each disorder. Across each model, a unidirectional association was found with loneliness predicting future symptoms of internalised distress, but these symptoms did not predict future loneliness. Further, neither gender nor age was found to have a moderating effect these longitudinal associations. Our findings have important clinical implications in preventing and/or treating internalising psychopathologies and highlight the importance of addressing loneliness among the general adult population.

Biography:

Dr Robert Fox is an Assistant Professor in Psychology at the National College of Ireland. His research interests focus primarily on the areas of psychotraumatology, loneliness, and psychopathology. This research includes applying advanced statistical models to examine areas of mental health such as psychological responses to trauma, how mental illness manifests across various groups, and identifying the role loneliness plays in the development of mental health disorders, using large-scale, longitudinal, and nationally representative datasets. Further information available at <u>ResearchGate</u>



Title: Understanding and predicting spatial navigation ability in humans using brain oscillations and learning behaviour

Abstract:

Human spatial navigation is an essential cognitive skill, involving the learning of new environments and the recall of spatial information. This process relies on multiple brain rhythms, yet the specific roles of these cortical oscillations remain underexplored. Using NavWell, a virtual maze task, we established that spatial learning is characterised by decreases in frontal-parietal theta (4–8 Hz) in learners compared to controls. During a 60-second recall trial, successful navigators exhibit pronounced increases in frontal-central delta (2–4 Hz), theta (5–7 Hz), and posterior beta (15–29 Hz) and gamma (30–40 Hz) power relative to controls. When comparing recent and remote retrieval, older adults showed marked reductions in high-frequency oscillations and attenuated delta/theta modulations, accompanied by declines in behavioural performance. Hidden Markov models combined with machine learning applied to task-evoked EEG features reliably classified successful spatial learners, outperforming traditional EEG and behavioural metrics. In contrast, resting-state EEG fails to predict navigation performance, highlighting the importance of task-evoked neural dynamics. This presentation will discuss the neural mechanisms of spatial navigation across learning, memory, and ageing. It will also evaluate the potential of computational neuroscience to support early detection of navigation-specific deficits, an early cognitive marker for preclinical Alzheimer's disease.

Biography:

Dr Conor Thornberry (B.A., M.Sc., Ph.D.) is an Assistant Professor in Psychology at the National College of Ireland. Before joining NCI, he graduated with a B.A. (Hons) in Psychology in 2018 and a M.Sc. by research in 2019 from Maynooth University. He completed his funded Ph.D. in early 2024 at Maynooth University. Conor has published his research findings in leading international neuroscience journals including European Journal of Neuroscience, Reviews in the Neurosciences & Neuroinformatics. He has won over €70,000 in funding to date and was awarded a Young Investigator Award from the European Brain & Behaviour Society in recognition of his work.

Conor is interested in how our brain constructs spatial representations and uses them to learn, remember and navigate. He is also interested in how these systems change with healthy ageing and age-related diseases such as dementia. Conor's work uses a range of methods including neuroimaging (EEG), virtual reality and machine learning to understand the behavioural and neural properties of human spatial cognition. Further information can be found <u>here</u> and through <u>Google Scholar</u>.