

Precision Convergence Webinar Series

Computation May Be All You Need: Is Intelligence Convergent?

By Mark Daley

Western University, Ontario

With High-Level Panel of Leaders in Science, Technology, On-the-Ground Action, and Policy

Wednesday, May 31, 2023 | 11 AM to 1 PM EST (2 hours in duration)

For Remote Participation, please register [HERE](#)

ABSTRACT: Large language models evolving from artificial intelligence and other digital capacity building eating the world by getting bigger. What higher order lessons might we extract from this unreasonable effectiveness of scaling? In this presentation, I will return all the way to the origin of neural nets and review the foundational ambitions of McCulloch and Pitts through the computationalist lens of the early program of Putnam and Fodor. We then jump to the present, adopting an empirical stance, asking how LLMs challenge our notions of human creativity, intelligence, and personhood. Focussing on intelligence, we take a brief detour to engage with Sutton's "bitter lesson" (more computation is all you need), and survey known exemplars of intelligence. We question the existence of Aaron Sloman's "exotic minds" by suggesting that his space of possible minds is, in fact, degenerate. We close by pulling the thread of precision convergence through our discussion, arriving at the Singular Intelligence Hypothesis that will bear on computational rationality as a key bridge between human and machine decision-making and behaviour.



PRESENTER: Mark Daley is the chief digital information officer at Western University, a full professor in the Department of Computer Science at Western University, with cross-appointments in multiple departments, The Rotman Institute of Philosophy, and The Western Institute for Neuroscience. He is also a faculty affiliate of Toronto's Vector Institute for Artificial Intelligence. Mark has previously served as the Vice-President, Research at the Canadian Institute for Advanced Research (CIFAR), and Associate Vice-President (Research) and Special Advisor to the President at Western. Mark was the institutional administrative lead for the successful Canada First Research Excellent Fund proposal "BrainSCAN: Healthy Canadian Brains for Life". \$66M. He has published over 100 research articles and has been awarded U.S, European, and Chinese patents for metabolomics profiling of concussion and has US patents pending for COVID-19 diagnostics.

About the series: The [precision convergence series](#) is launched to catalyze unique synergy between, on the one hand, novel partnerships across sciences, sectors and jurisdictions around targeted domains of real-world solutions, and on the other hand, a next generation convergence of AI with advanced research computing and other data and digital architectures such as [PSC's Bridges.2](#), and supporting data sharing frameworks such as [HuBMAP](#), informing in a real time as possible the design, deployment and monitoring of solutions for adaptive real-world behavior and context.

The McGill Centre for the Convergence of Health and Economics (MCCHE) is a virtual world network of scientist, action and policy leaders promoting the weaving of digital-powered interdisciplinary science into person-centered domain-specific solutions at scale to global challenges faced by traditional and modern economy and society worldwide. The MCCHE stimulates lasting collaborations that bridge the many divides in the market, economy, and society that are at the root of these most pressing modern challenges through collaborative of modular convergence innovation platforms.

The Pittsburgh Supercomputing Center is a joint computational research center between Carnegie Mellon University and the University of Pittsburgh. Established in 1986, PSC is supported by several federal agencies, the Commonwealth of Pennsylvania and private industry. PSC provides university, government, and industrial researchers with access to several of the most powerful systems for high-performance computing, communications, and data-handling available to scientists and engineers nationwide for unclassified research. PSC advances the state-of-the-art in high-performance computing, communications and informatics and offers a flexible environment for solving the largest and most challenging problems in computational science.

Co-Chairs:



Laurette Dubé, PhD is the founding Chair and Scientific Director of the McGill Centre for the Convergence of Health Economics. She holds the James McGill Chair of Consumer and Lifestyle Psychology and Marketing. Her work has been published in top disciplinary journals in Psychology, Management and Medicine as well as in multidisciplinary journals. She holds an MBA in finance, and a PhD in behavioural decision making and consumer psychology. During her 2020-2021 sabbatical, she is a visiting scholar at the National Research Council of Canada and at the Pittsburgh Supercomputing Center, Carnegie Mellon, USA. <https://thefutureeconomy.ca/interviews/laurette-dube>



Sergiu Sanielevici, Ph.D. is Director of Support for Scientific Applications at the Pittsburgh Supercomputing Center, a joint project of Carnegie Mellon University and the University of Pittsburgh. He has served as the Deputy Director of the Extended Collaborative Support Service of the US NSF XSEDE project and as the manager of its Novel and Innovative Projects program, fostering non-traditional and interdisciplinary applications of advanced computing and data resources since 2011. He is currently the Principal Investigator of the Bridges-2 project and co-Principal Investigator of the Neocortex project at PSC. Dr. Sanielevici is a proud alumnus of McGill University (Ph.D., Physics, 1986).

Panelists:



Blake Richards is a Fellow in CIFAR's Learning in Machines & Brains program and a Canada CIFAR AI Chair at Mila. Richards is an assistant professor in the School of Computer Science and the Montreal Neurological Institute at McGill University. Richards' research explores the general principles of intelligence that underpin both natural and artificial cognition. His research program focuses on neural computation, learning, and artificial intelligence (AI). Using a combination of computational modelling and advanced neuroscience and brain imaging approaches, his lab is exploring the neural basis of deep learning. The goal of this work is to better understand the neurobiological basis of animal and human intelligence and provide new insights to help guide AI development. His laboratory has made several important contributions to mathematical models of learning and memory in the brain. These have provided new insights on the process of memory consolidation, and how cellular-level brain structures may permit deep learning in real brains. This theoretical work has been well-recognized in both the neuroscience and AI communities, and Richards is considered a leading researcher at this disciplinary intersection.



Steve Simske received a post-Doctoral degree in aerospace engineering and a post-Doctoral degree in Electrical and Computer engineering from the University of Colorado. From 1994 to 2018, he was an engineer (HP Fellow since 2011), Vice President, and Director at HP Labs. Since 2018, he is a Faculty Professor of Systems Engineering at Colorado State University (CSU). He is the author of more than 450 publications and more than 230 US patents. His research interests include analytics, systems security, sensing, signal and imaging processing, printing and manufacturing, and situationally aware robotics. Dr. Simske is an IEEE Fellow, an NAI Fellow, an IS&T Fellow, and its immediate past President (2017-2019). Steve completed a CSU Faculty Institute for Inclusive Excellence (FIIE) Fellowship in 2020 and was a CSU Best Teacher awardee in 2022. In his 20+ years in the industry, he directed teams to research 3D printing, education, life sciences, sensing, authentication, packaging, analytics, imaging, and manufacturing. He has written four books on analytics, algorithms, and steganography. At CSU, he has a cadre of on-campus students in Systems, Mechanical, and Biomedical Engineering and a larger contingent of online/remote graduate students researching various disciplines



Jon Chun researches ML/AI approaches to NLP with a particular focus on LLMs, narrative, AffectiveAI, and XAI/FATE. He was a successful Silicon Valley entrepreneur/CEO as well as Fortune 500 Director of Development and has worked in a wide variety of fields. Most recently, he created the open-source library SentimentArcs, the world's largest ensemble for diachronic sentiment analysis and the basis for Elkins's "The Shape of Stories" (Cambridge UP 2022). He presented some of the earliest GPT-2 story generation work at Narrative2020 and has since published in *Cultural Analytics* and *Narrative* on AI and Narrative. He recently presented on multimodal script generation. He has mentored hundreds of computational AI/ML Digital Humanities projects in the Kenyon DH Colab. He recently presented on generative AI at Narrative2023, MedCon 2023, and is an AI consultant with various industry groups. He is currently working on "Exploring the Black Box: Narrative XAI" for a special issue of *The International Journal of Digital Humanities*.



Katherine Elkins is Professor of Humanities and Computing at Kenyon College, where she directs and teaches in the Integrated Program in Humane Studies and is Founding Co-Director of the KDH Lab. With over a dozen articles and two books, her research focuses on embodied experience, language, and generative AI. In *The Shapes of Stories* (Cambridge UP) she develops the first robust methodology to surface the emotional arc in stories using the latest AI models. She often speaks publicly about AI, most recently as a guest on RadioAI, and consults for both government and industry.



Jian-Yun Nie is a professor at the Department of Computer Science and Operations Research, University of Montreal, and Canada research chair on natural language processing and applications. His research focuses on various problems of information retrieval and natural language processing, including information retrieval models, web search, cross-language information retrieval, recommendation systems, query suggestion, question answering and dialogue. Jian-Yun Nie has published over 250 papers in the main journals and conferences in IR and NLP. He is an associate editor of 4 journals. He has served as general chair, PC chair and local organization chair for SIGIR conferences, as well as for several other conferences and workshops. He regularly serves as senior PC members of major conferences such as SIGIR, CIKM, ACL, EMNLP, COLING, WWW. He received several best paper awards, including a Best paper award and a Test-of-Time honorable mention award from SIGIR. He is inducted to the ACM SIGIR Academy in 2022.