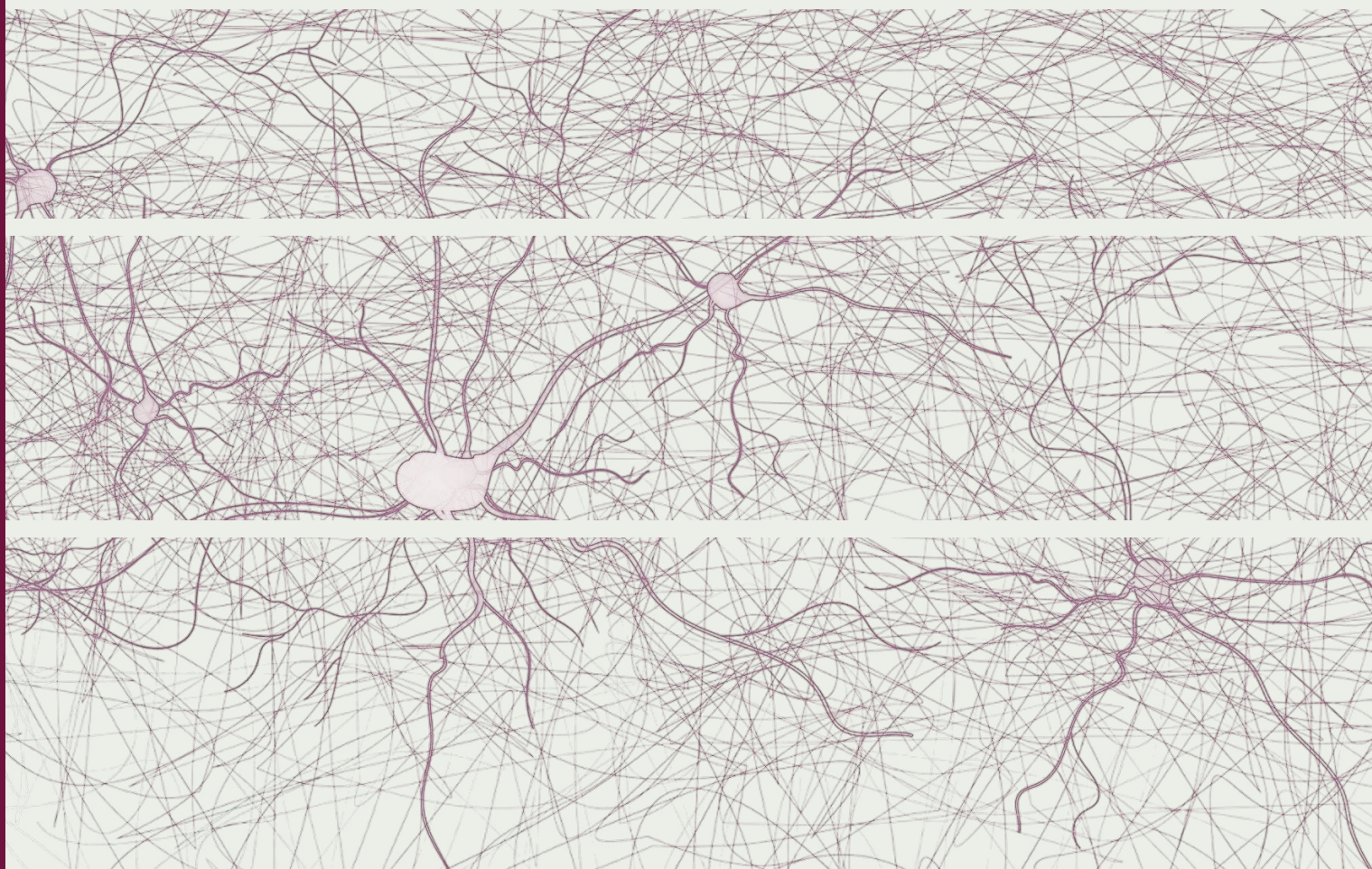


ANNUAL REPORT 2025



Centre for
**Advanced Research
in Experimental & Applied Linguistics**



MESSAGE FROM THE DIRECTOR



DR. IVONA KUČEROVÁ

ARIEAL DIRECTOR

For ARIEAL, the year **2025** provided an opportunity to strengthen existing initiatives and collaborations while launching new ones that will shape our approach to research and student training for years to come. **Artificial intelligence**, of course, remains a central focus that cannot be ignored, as AI has become an integral part of our everyday lives, with its promise and increasing concerns about its potentially negative impacts. In 2025, we refined our approach to AI research, placing greater emphasis on its implications for workforce development and productivity in Canada. As AI continues to transform how we live and work, language remains the critical interface between people and technology. This places us in a unique position to bring together expertise in linguistics, cognitive science, and engineering to develop solutions to AI that are both technologically innovative and human centred.

As such, working alongside a growing network of academic, industry, and community partners, we are advancing research that evaluates and improves the accessibility, usability, and effectiveness of digital tools and reskilling programs designed to help Canadians thrive in

an AI-enabled economy. Our team moved forward on a range of new partnerships, research, and training initiatives. Supported by funding from the **Social Sciences and Humanities Research Council of Canada (SSHRC)** and **McMaster University**, we expanded our international collaborations with European partners to develop language-centred methodologies for the verification, evaluation, and usability of emerging digital technologies. These collaborations are helping to establish best practices for designing AI-enabled tools that are effective, accessible, and responsive to the needs of diverse users. This is also reflected in the achievements of our researchers. **Dr. Victor Kuperman** was awarded a prestigious **Dorothy Killam Fellowship** to advance research on improving literacy in Canada's official languages, leveraging AI to generate personalized reading and language-learning materials tailored to learners' proficiency levels and linguistic backgrounds.

Over the last year, we also reinforced our position at the intersection of STEM (Science, Technology, Engineering, Mathematics, and Medicine) and the Humanities at McMaster University. By drawing on the expertise of our interdisciplinary team and our innovative STEM-based research methods, we launched several outreach and

knowledge mobilization initiatives that reinforce ARIEAL's position as a hub for STEM-informed research within the Faculty of Humanities. In addition to organizing events that showcased this interdisciplinary approach, we expanded our outreach efforts to engage prospective students interested in pursuing research and training at the intersection of STEM and the humanities.

One of our greatest strengths remain our collaborative research approach. By bringing together researchers, trainees, and partners across disciplines, we continue to produce innovative, impactful research while creating meaningful opportunities for student learning and professional development. Many of our journal articles and conference papers were co-authored by researchers and trainees, reflecting years of collaboration across ARIEAL's laboratories and research programs. This collaborative approach is reflected in projects such as **Dr. Victor Kuperman** and **Dr. Lauren Fink's** Reading in Museums study, where researchers and trainees worked together to use mobile eye-tracking technology at the McMaster Museum of Art to better understand how visitors engage with exhibitions. By combining eye-tracking data with visitor feedback, the research provides new insights into how exhibit labels shape learning outcomes and how the visual characteristics of museum objects influence the ways visitors navigate exhibition spaces. The project exemplifies how interdisciplinary collaboration can produce research with practical applications while providing trainees with valuable hands-on experience using cutting-edge research methods in real-world settings.

At the heart of these initiatives remain our people and their commitment to research excellence. In 2025, ARIEAL researchers published **54** peer-reviewed journal articles, **17** conference proceedings papers, and **two** technical reports. They also delivered **67** conference presentations, invited talks, and posters at leading international conferences and



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academic institutions around the world. Many of these were co-authored and co-presented with our trainees, highlighting the important role students play in ARIEAL's research and the mentorship and training provided by our members. Our researchers also continued to attract external support for their work. In 2025, ARIEAL and its members secured **16** research grants totaling more than **\$4** million to support research, knowledge mobilization, and trainee development, building on the more than **\$15** million awarded in 2024. These grants will enable our researchers to advance innovative, interdisciplinary research while fostering new collaborations with academic, industry, and community partners at McMaster, across Canada, and around the world.

As always, our **trainees** remain at the heart of ARIEAL's research, knowledge mobilization, and outreach efforts. Through the leadership of the **ARIEAL Operational Team**, they have played a central role in organizing professional

development and community engagement activities, including hands-on workshops in electroencephalography (EEG) for students from the Hamilton-Wentworth District School Board and Halton District School Board. In partnership with **iSTEP** – McMaster University's STEM enrichment program – we also introduced high school students from racialized communities across the Hamilton and Halton regions to the field of languagesciences. Through interactive demonstrations using cutting-edge technologies such as EEG, eye tracking, and ultrasound imaging, students experienced firsthand how STEM-based research methods can be applied to answer fundamental questions in the humanities. Their contributions also extended to scholarly communication. Thanks to the dedication of our editorial team, the third volume of the **ARIEAL Research Magazine** was published, showcasing the outstanding research being conducted by our students. Building on the success of previous editions, Volume 3 marked an important

milestone as the magazine evolved into an international peer-reviewed journal.

As always, I am deeply grateful for and inspired by the dedication of my colleagues and our trainees. Your commitment to advancing research, knowledge mobilization, and student training has been the driving force behind ARIEAL's continued success. Equally important is your commitment to our shared values of collaboration, innovation, and inclusivity. Together, you have helped establish ARIEAL as a global leader in applied and experimental linguistics, and I look forward to all that we will accomplish together in the years ahead.

Wishing you all a safe, peaceful, healthy, and productive year.

Ivona Kučerová

Ivona Kučerová

2025 RESEARCH HIGHLIGHTS

ARiEAL is a research centre that brings together a collaborative and interdisciplinary community of researchers ranging from undergraduate trainees to established scholars and empowers them to excel in their problem-driven language science research across fundamental, experimental, and applied linguistics. Our work is grounded in principles of equity, diversity, and inclusion, and we are committed to rigorous, ethical scientific inquiry and to the complementarity of fundamental and applied research. This report highlights the research, knowledge mobilization, outreach, professionalization, and training activities undertaken by ARiEAL and its laboratories for the year 2025.

BRODBECK LAB

Dr. Christian Brodbeck is an Assistant Professor in the Department of Computing and Software. His research aims to understand and measure how the brain processes speech. He is particularly interested in how people comprehend speech in realistic settings, including continuous, meaningful speech and speech in noisy environments. Dr. Brodbeck primarily works with electrophysiological brain signals – electroencephalogram (EEG) and magnetoencephalogram (MEG) – and computational models. EEG and MEG allow us to measure brain activity with millisecond resolution, capturing brain responses to rapidly evolving speech signals. Computational models of speech recognition allow us to better understand the transformations necessary for recognizing speech, and they also allow us to make quantitative

predictions about brain activity.

In 2025, Dr. Brodbeck published several peer-reviewed articles, many appearing in high-impact journals, including *the Journal of Neuroscience* and *PLOS Computational Biology*. Dr. Brodbeck also won numerous prestigious research grants, including from Natural Sciences and Engineering Research Council of Canada, Ontario Centre of Innovation, and the National Institutes of Health (NIH) for projects titled “Neuro-Computational Foundation of Human Speech Recognition,” “Natural conversation in a cognitive architecture,” and “CRCNS: Predictive Models of Human Speech Recognition in Natural Environmental Noise.” Finally, one of Dr. Brodbeck’s trainees, Joon Chung, completed their honours thesis in 2025. Congratulations!



DR. CHRISTIAN BRODBECK

GRAMMATICAL THEORY GROUP



DR. ALISON BIGGS

Dr. Alison Biggs is the Director of the Grammatical Theory Group. An Assistant Professor in the Department of Linguistics and Languages at McMaster University, Dr. Biggs’ research focuses on the formal characterization of speaker knowledge of language. Her main area of research is syntax and its interfaces with morphology, semantics, and the lexicon. Her research also examines linguistic variation, both cross-linguistic (the possible and impossible ways in which languages and dialects can vary from each other) and inter-individual variability.

In 2025, Dr. Biggs had four papers accepted for publication, including in the *Proceedings of the 55th Annual Meeting of the North East Linguistic Society*, *Proceedings of the Linguistic*

Society of America, the *Proceedings of the 43rd Annual Meeting of the West Coast Conference on Formal Linguistics*, and *Sinn und Bedeutung*. Dr. Biggs also presented her research at several international academic conferences and workshops, including a plenary talk at the MOTH Syntax Workshop at the University of Toronto, as well as presentations at the Linguistic Society of America and the West Coast Conference on Formal Linguistics. Three new trainees joined Dr. Biggs’ Grammatical Theory Group in 2025: Sandrine Guilbert (doctoral student), Benjamin Earle (undergraduate Honours thesis student), and Amba Mohammed (undergraduate Honours thesis student). One of Dr. Biggs’ trainees, Rankini Kulatilake, completed their B.A. this year. Congratulations!

LEXLAB



DR. PHOEBE GASTON

Dr. Phoebe Gaston is an Assistant Professor in the Department of Linguistics and Languages and the Director of the LexLab. She specializes in psycholinguistics and the cognitive neuroscience of language. Her research focuses on word recognition, lexical representation, syntactic structure-building, and the neural and cognitive mechanisms underlying top-down context effects in language comprehension. She uses behavioral, electrophysiological, and neuroimaging data, as well as computational modeling approaches.

In 2025, under the leadership of Dr. Gaston, electroencephalogram (EEG) data collection continued in the lab and a large team of undergraduate research assistants because proficient with this method. The lab also hosted part of

the 2025 PNB EEG Interdisciplinary workshop. Dr. Gaston advanced research on one major funded project through a Collaborative Research in Computational Neuroscience U.S.-Spain Research Proposal with the National Science Foundation, titled "Tracking and modeling the neurobiology of multilingual speech recognition." She developed a research proposal for the NSERC Discovery Grant program and advanced several other projects in progress toward publication. Finally, Honours Health Sciences student Saarah Bagha completed her undergraduate thesis in the lab and Simran Sandal graduated with her M.Sc. in Cognitive Science of Language, after defending her thesis project on "Investigating speech perception and individual variation in cognitive-behavioural traits" using EEG. Congratulations Saarah & Simran!



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IMAGING PHYSICS & ENGINEERING, IMAGING RESEARCH CENTRE



DR. MICHAEL NOSEWORTHY

Dr. Michael Noseworthy is a Professor in the Department of Electrical and Computer Engineering and Associate Chair (Research) in the Department of Radiology. He is also the Director of Medical Imaging Physics and Engineering at the Imaging Research Centre at St. Joseph's Healthcare, Hamilton. He has also played a major role in bringing the new imaging centre on campus to fruition – the Centre for Integrated and Advanced Medical Imaging (CIAMI), a joint project between McMaster University and Mohawk College. Dr. Noseworthy's research interests focus on the assessment of tissue microstructure and metabolism using multimodal medical imaging, such as magnetic resonance imaging (MRI) and in vivo nuclear magnetic resonance (NMR) spectroscopy. His work heavily involves developing imaging hardware and software, and his research team studies physiological problems and diseases using advanced medical imaging techniques.

In 2025, Dr. Noseworthy and his team published several articles, many appearing in high-impact journals, including *Frontiers*

in Endocrinology, NMR in Biomedicine, Biomedicines, Nature Communications Medicine, European Journal of Neuroscience, Journal of Medical Artificial Intelligence, Journal of Orthopaedic Research, and ERJ Open Research. Dr. Noseworthy also published a technical report on MRI acceptance testing for Lake of Woods Hospital and was invited to present his research at numerous international academic institutions, conferences, and symposia. These included presentations at the University of Toronto, the MR User Symposium 2025 in Niagara-on-the-Lake, the Guyana National Imaging Conference in Georgetown, and the Annual Research Meeting of the Michael G. DeGroote Institute for Pain Research & Care. Three new M.Sc. students joined the Imaging Physics and Engineering, Imaging Research Centre this year: Lynley McIntee, Luke Hendrikx, and Aaron Hodgson. Finally, five of Dr. Noseworthy's graduate students received their degrees in 2025: Lauren Stephens (M.Sc.), Dr. Calvin Zhu (Ph.D.), Dr. Nicholas Simard (Ph.D.), Dr. Cameron Nowikow (Ph.D.), Dr. Mitra Tavakkoli (Ph.D.) Congratulations!

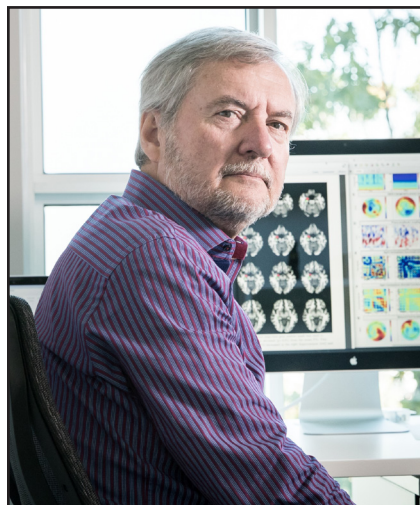


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LANGUAGE, MEMORY, & BRAIN LAB

The Language, Memory, and Brain (LMB) Lab is co-directed by **Drs. John Connolly** and **Elisabet Service**. Dr. Service investigates the cognitive building blocks of language development and their relationship with working memory. Her research focuses on first and second language acquisition, spoken word processing, and other related cognitive processes. Much of this work is then applied to investigations of language disorders, including dyslexia. Dr. Connolly's work uses EEG methods to study brain health and language functions.

In 2025, Dr. Service prepared several articles for publication, including a number co-authored current and former trainees. For example, together with former doctoral student Fareeha Rana and current ARIEAL members Dr. Daniel Pape and Dr. John Connolly, Dr. Service submitted an article titled "Improved methods reveal longer temporal window of auditory integration" to the *European Journal of Neuroscience*. Dr. Service was also invited to present a paper titled "Researching work tasks that may be affected by second language use" at the inaugural conference celebrating



DR. JOHN CONNOLLY

the launch of the McMaster Centre for Research on Employment and Work. Dr. Service also continued research on two major funded projects: one investigating the impact of temporal patterns on short-term memory for speech and on language learning, funded by an NSERC Discovery grant; and another examining the effects of working in a



DR. ELISABET SERVICE

second language on strategic thinking, funded by a SSHRC Insight Grant. Finally, one of Dr. Service's trainees, Dr. Bre-Anna Owusu, completed their Ph.D., while two of her undergraduate trainees, Sakina Abidi and Madison Won, completed their undergraduate degrees in 2025. Congratulations to all!

MELD RESEARCH LAB

The McMaster English Language Development (MELD) Programs and the MELD Bilingualism Lab are directed by **Dr. Anna Moro**, the Associate Director of ARIEAL. The MELD programs are intended for international students whose primary language is not English but who wish to improve their English proficiency to succeed in an English-speaking higher education environment. Since 2018, the MELD Programs have expanded their services from the MELD Diploma to also include the McMaster English Readiness for Graduate Excellence (MERGE) and the McMaster Office for the Development of English Language Learners (MODEL) to offer an even more comprehensive range of services to international students of all levels. Both MELD and MODEL incorporate problem-based learning

and reflective practice in their curricula. In 2024, a new intensive seven-week undergraduate bridging program, the Summer Transition through English Prep (STEP), welcomed its inaugural class. The MELD Bilingualism Lab investigates the underlying linguistic mechanisms of bilingual phenomena and focuses on second language development.

In 2025, Dr. Moro, together with ARIEAL research associate Dr. Daniel Schmidtke, published an article titled "EAL reading growth during and beyond an undergraduate transition program: a 4-year longitudinal eye-movement study" in *Reading and Writing*, as well as another titled "DerLex: An eye-movement database of derived word reading in English" in *Behavior Research Methods*.



DR. ANNA MORO

NEUROTECHNOLOGY & NEUROPLASTICITY LAB



DR. SUE BECKER

Dr. Sue Becker has been the Director of the Neurotechnology & Neuroplasticity Lab for 30 years until retiring in 2023. Her lab has used computational modeling and empirical studies to investigate the neural bases of learning and memory and how it serves functions such as episodic future thinking, planning, and decision-making. Dr. Becker's lab has addressed research questions such as how the hippocampus codes episodic and spatial memories, and how stress, exercise, and neurofeedback affect hippocampal memory functions and intrinsic brain networks. This research can be applied to brain-computer interfaces, sensory substitution for prosthetic limbs, and furthering our understanding of memory-related disorders such as post-traumatic stress disorder.

In 2025, Dr. Becker and her team published several articles in high-impact journals. These included "A New Measure of Mnemonic Discrimination Applicable to Recognition Memory Tests with Continuous Variation in Novel Stimulus Interference" in *Brain and Behaviour*, "Unraveling Trauma Memory: Differential Roles of Anterior and Posterior Hippocampus in Trauma Recall in Post-traumatic Stress Disorder and Its Dissociative Subtype" in *Neuroimage Reports*, and "Agency in the Social World: Racial Bias Expectations and Perceptions of Social Identity Threat Reduce Intentional Binding" in *Social Cognition*. Finally, two of Dr. Becker's trainees completed their doctorates in 2025. Congratulations, Dr. Allison Mizzi and Dr. Selena Singh!

READING LAB



DR. VICTOR KUPERMAN

The Reading Lab, directed by **Dr. Victor Kuperman**, targets a range of areas in psycholinguistics and corpus linguistics with research foci such as the cognitive and socio-demographic predictors of literacy and reading comprehension in adults across languages. The Reading Lab's research paradigms include eye-tracking, behavioural studies, large-scale norming studies, and quantitative analyses of written and spoken corpora.

In 2025, Dr. Kuperman published several articles in high-impact journals, including *Behavior Research Methods*, *Frontiers in Education*, *Scientific Data*, *Studies in Second Language Acquisition*, *Quarterly Journal of Experimental Psychology*, and *Language Resources and Evaluation*. Several of these publications were produced with former and current trainees, including "Dataset on cognitive and social well being of older adults around the COVID-19 pandemic: The CoSoWELL corpus of written life stories, release 2," co-authored with current doctoral trainee Marc-Antoine Paul and "The Eye Movement Database of Passage Reading in Vertically Written Traditional Mongolian," co-authored with current trainee Yaqian Bao. Dr. Kuperman was also invited to present his research at numerous international conferences, workshops, and universities, including the City University of New York, the Institute for Literature and Language Science, Pontificia Universidad Católica de Valparaíso, and the University of Essex. In 2025, Dr. Kuperman's lab also welcomed one new trainee: Dr. Émalie Hendel, SSHRC Postdoctoral Fellow.



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PHONETICS LAB



DR. DANIEL PAPE

Dr. Daniel Pape is the Director of the Phonetics Lab. His research examines experimental phonetics and spoken speech acoustics, the link between spoken speech production and cognition, and the relationship between phonetics and neurolinguistics. A continuing research stream examines whether different populations produce differences in their produced speech patterns, and

how these differences are manifested in their cognition. More specifically, the Phonetics Lab examines how (nonclinical) autism spectrum disorder (ASD) differences in students manifest in their spoken speech and how that might support communication between students with varying presentations of autism spectrum disorder. A second stream examines production and perception differences among bilingual and non-native speakers with different degrees of proficiency in their respective spoken languages, using ultrasound methods and acoustics. There are also ongoing research streams on heritage languages (more specifically Arabic and Italian), and research on how the pronunciation of names from different cultures and languages are perceived in the Canadian University background, and how students from these cultures and languages perceive and feel about the manipulation of names in the Canadian landscape. Finally, projects using medical Ultrasound equipment is examining speech articulation differences in foreign and second language speech.

In 2025, Dr. Pape published several articles, including many in high-impact journals. Together with ARiEAL

postdoctoral trainee Dr. Maiia Bulakh, Dr. Pape published an article titled "Obstruent Coarticulation Patterns of Ukrainian Speakers' L1 and L2 Production: An Ultrasound Study" in the *Proceedings of the 6th Phonetics and Phonology in Europe Conference*. With the undergraduate trainee Judy Meshmesh and Dr. Gemma Repiso-Puigdelliura he presented the work on Canadian Arabic Heritage speakers at the international conference *New Sounds* in Toronto. He also submitted additional manuscripts for publication, including "The Influence of Allophonic Variation on the Perceived Charisma of a Speaker" to the journal *Phonetica* and "Voicing perception for intervocalic velar plosives in English: a biomechanical cue-trading study" to *Language and Speech*. Dr. Pape also presented his research at international conferences, including the 6th Phonetics and Phonology in Europe conference (PaPE), held in Palma de Mallorca. Finally, two of Dr. Pape's trainees completed their degrees this year: Simran Sandal (Master's degree) and Judy Meshmesh (undergraduate degree). Congratulations! Finally, three new trainees joined Dr. Pape's lab in 2025: Josiah Ferguson (M.Sc.), Coleson Shepherd (M.Sc.), and Madelaine Jarcew (M.Sc.).

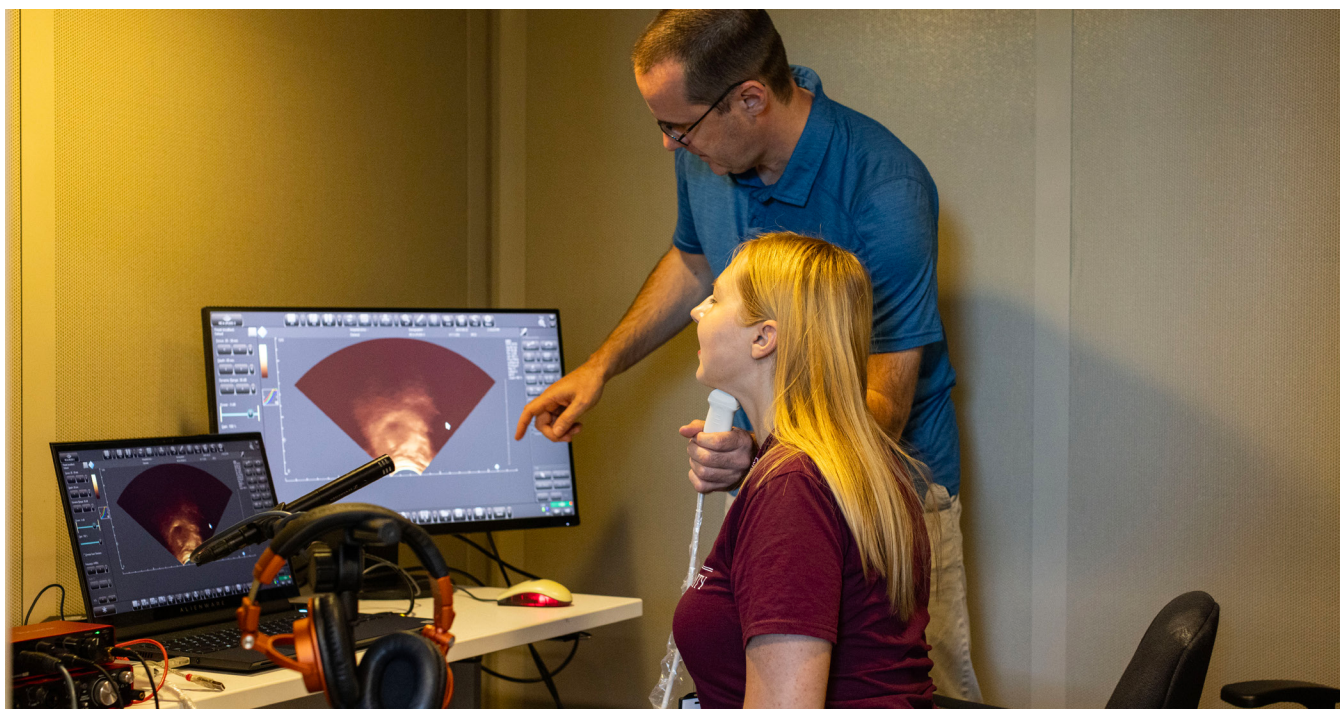


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SONNADARA LAB



DR. RANIL SONNADARA

Directed by **Dr. Ranil Sonnadara**, the Performance Science Lab aims to understand the science and art behind human performance in all its forms. More specifically, the lab investigates how individuals learn complex skills, how information flows across the motor and perceptual systems change with practice, and how feedback and assessment can be effectively implemented to support skill acquisition. Much of the lab's current work focuses on education and assessment of health professionals, musicians, and athletes.

In 2025, Dr. Sonnadara published several articles in high-impact journals, including "Learning how to suture: Should learners observe a demonstration of someone who is experienced or inexperienced to improve their own performance?" in *The American Journal of Surgery*, "Creativity research in medicine and nursing: A scoping review" in *Plos One*, and "The McMaster Narrative Comment Rating Tool: Development and Initial Validity Evidence" in *Teaching and Learning in Medicine*. Finally, one of Dr. Sonnadara's trainees, Nadeen Eskander, completed their Master's in Health Science Education in 2025. Congratulations!

SYNTAX LAB



DR. IVONA KUČEROVÁ

Dr. Ivona Kučerová, Director of the Syntax Lab and ARIeAL, investigates syntactic structures, with a specific focus on the syntax-semantics interface. More specifically, the lab is investigating whether and how semantic information can modulate syntactic derivation. Both traditional fieldwork and experimental methods are used to collect data from cross-linguistically diverse languages, including Indigenous languages of Canada. The goal of this research is to identify and model universal and language-specific

structural properties of human languages. The primary focus of the work currently conducted in the Syntax Lab is on modeling features at the syntax-semantics interface.

In 2025, Dr. Kučerová received several research grants and awards, including a SSHRC Insight Grant for a project titled "Nominal integration in associative, comitative and accompaniment structures: A comparative syntax study" and a SSHRC Destination Horizon grant for a project titled "Closing the digital divide: Accessibility, employability, and safety." Dr. Kučerová's team in a close collaboration with their Indigenous partners also produced a technical report titled "Tehatiwennathe'tányons; Online resource hub for community based Indigenous adult immersion programs"

and presented her research at several international conferences and invited lectures, including Sinn und Bedeutung 30 at Goethe University, the 20th Annual meeting of the Slavic Linguistics Society at University of Verona, the 2nd International Workshop on the Syntax of Predication and Modification at the Hungarian Research Centre for Linguistics, and the International Conference on Language and Communication at the University of Graz. Dr. Kučerová also welcomed several graduate and undergraduate students to her lab, including Ethan Stollar (Ph.D.) Paloma Van Vliet (Master's), Emmanuel Gil (Master's), and Radin Sedghi-Alherd (Master's). Finally, Dr. Fareha Rana and Dr. Alina Dochu completed their postdoctoral fellowships under Dr. Kučerová's supervision in 2025. Congratulations!



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TURKSTRA LAB

Dr. Lyn Turkstra is the Director of the Turkstra Lab, which focuses on the links between cognitive function and social communication in individuals with traumatic brain injury (TBI). The lab conducts both experimental and translational research on communication in adolescents and adults, and collaborates on development of practice standards to translate research findings into improved clinical practice and long-term patient outcomes.

2025 was another busy year for the Turkstra Lab. Dr. Turkstra received Honors of the American Speech-Language-Hearing Association, the organization's highest recognition, acknowledging a lifetime of groundbreaking contributions to the field of communication sciences and disorder. Congratulations, Lyn! Dr. Turkstra and her collaborators also published numerous articles in high-impact journals, including "Interprofessional Cognitive-Communication Rehabilitation Patterns for Children and Adolescents With Acquired Brain Injuries: A Retrospective Medical Chart Review" in *American*

Journal of Speech-Language Pathology, "Social-legal knowledge in adults with and without traumatic brain injury" in *Brain Impairment*, and "Development of the Common Cognitive Complaints after Concussion (C4) Questionnaire: A treatment-planning tool for adults with mild traumatic brain injury" in *Frontiers in Neurology*. Dr. Marie-France Perrier completed their doctoral dissertation on mindfulness meditation for children with acquired brain injury, and Dr. Fiona Campbell completed their dissertation on augmentative and alternative communication for nonspeaking ICU patients. Congratulations! At the undergraduate level, Israa Lotlikar and Taylor Chan completed their honour's theses on parental roles in social media use for adolescents with acquired brain injury and end-of-life decision making in amyotrophic lateral sclerosis, respectively. Finally, Sophia Chander, Robyn Grix, and Tasnim Shahid began new research projects examining the prevalence of traumatic brain injury and intimate partner violence in incarcerated women, hearing and participation in a community sample of older adults,



DR. LYN TURKSTRA

and referral of right-hemisphere stroke patients to speech-language pathology services. The lab is proud of its graduates who are now pursuing graduate studies in speech-language pathology, psychology, neuroscience, and undergrad medicine.

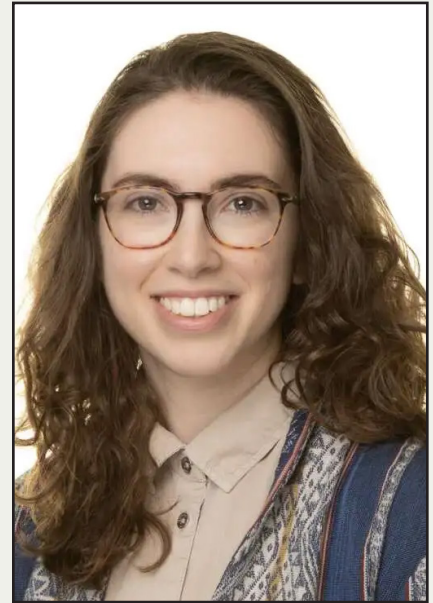


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BEAT LAB

Dr. Lauren Fink is the director of the Beat Lab, which aims to understand the physiological, psychological, and interpersonal changes induced through engaging with music. Dr. Fink's lab conceives of music as multimodal (auditory, visual, tactile, motor, etc.) and often incorporates methods like eye-tracking. Currently, one big focus is on multi-person physiological monitoring to better understand attention and immersion during social, musical contexts. For example, her lab can have up to 30 audience members wearing mobile eye-tracking glasses and customized smartwatches while watching a performance. The lab's custom software for data acquisition and analysis is freely available on GitHub: SocialEyes (<https://github.com/beatlab-mcmaster/SocialEyes>) and BEATmonitor (<https://github.com/beatlab-mcmaster/BEATmonitor>).

In 2025, Dr. Fink published numerous articles in high-impact journals, including "Computational modeling of rhythmic expectations: Perspectives, Pitfalls, and Prospects" in *PLoS Computational Biology*, "Mobile eye-tracking glasses capture ocular and head markers of listening effort" in *JASA Express Letters*, and "Audio-visual concert performances synchronize an audience's heart rates" in *Annals of the New York Academic of Sciences*. Dr. Fink was also invited to present her research at numerous international universities and conferences, including at the University of Cincinnati, the Montréal Neurological Institute & McGill University, The Mount Sinai Hospital, the University of Maryland, and the Université de Montréal. Finally, six of Dr. Fink's undergraduate students – Alador Bereketab, Ahmed Saeed, Megan Klose, Kyra Bonus, Gloria Liu, and Jackson Shi – and one Master's students – Joshua Schlichting – completed their degrees in 2025. Congratulations to all!



DR. LAUREN FINK

TRAINOR LAB



DR. LAUREL TRAINOR

Dr. Laurel Trainor's research focuses on auditory development and the perception of music, including work on pitch, tonality, timing, rhythm, neuroplasticity, and the role of music in social interaction, development, and developmental disorders. As the founding and present director of the McMaster Institute for Music & the Mind, Dr. Trainor also directs a unique research-concert hall (the LIVElab) with high acoustic control that is equipped with multi-person motion capture and EEG for studying how performers and audiences interact, and how music can be used to promote health and well-being. Her research includes using motion capture, EEG, eye gaze, and physiological responses to study complex interactional dynamics, such as between musicians as they perform, between musicians and audiences, and between caregivers and infants.

In 2025, Dr. Trainor and her team published numerous articles, including several in high-impact journals, such as *Human Movement Science*, *Journal of Cognitive Neuroscience*, *iScience*, *Cognitive Development*, *Scientific*

Reports, *Neuroimage*, *Attention*, *Perception*, & *Psychophysic*, amongst others. Dr. Trainor also was invited to present her research at the Glenn Gould Foundation World Congress at the Royal Conservatory of Music and the University of Granada, and delivered presentations at numerous international universities and conferences, including audidev: Auditory Development Workshop in Brussels, the Timing Research Forum Conference in Tokyo, the International Conference on Music Perception and Cognition in São Paulo, and the 20th Rhythm Perception and Production Workshop in Jyväskylä. Dr. Trainor and her team also secured new research and knowledge mobilization grants in 2025, including a CIFAR Research Fellowship and a Hamilton Community Foundation grant for a projected titled "LIVElab Science and Arts Youth Outreach." Finally, several of Dr. Trainor's trainees completed their degrees this year, including Dr. Miguel Martin (postdoctoral fellow), Chantal Carrillo (PhD), and multiple undergraduate honours students. Congratulations!

BY THE NUMBERS

Knowledge mobilization is at the core of ARiEAL's mission, values, vision, and strategic planning. We not only strive to produce interdisciplinary, collaborative, and ethical research, but we also strive to produce research that advances academic knowledge and benefits society. In 2025, our researchers were very active in disseminating their groundbreaking research by publishing articles, books, and chapters, and presenting at conferences and universities around the world. Our researchers have also secured prestigious research, knowledge mobilization, and training grants and awards.

PUBLICATIONS

In 2025, ARiEAL researchers published over **75 texts**, including, **54 journal articles**, **4 technical reports and research creations**, and **17 articles in conference proceedings**. These publications highlight the breadth of the research being done at ARiEAL and underscore the benefits of our interdisciplinary and collaborative approach. Many of the works listed below were co-authored by ARiEAL members and trainees, reflecting the interdisciplinary and cooperative nature of our research centre. Broadly speaking, publication topics include artificial intelligence, eye-tracking and reading, neurodevelopmental disorders and mental health, traumatic brain injuries, post-traumatic stress disorder, and auditory beat processing. These publications speak to the tremendous impact that our researchers have had in their respective fields.

JOURNAL ARTICLES (54)

Amador-Tejada, A., Sharma, B., Danielli, E. & **Noseworthy, M.D.** (2025). Resting-State fMRI (rsfMRI) Analysis for Brain Local Network Characterisation: A Narrative Review of Methods and Applications. *European Journal of Neuroscience* 62, e70276.

Anwarzi, D., **Becker, S.** & Obhi, S. (2025). Agency in the Social World: Racial Bias Expectations and Perceptions of Social Identity Threat Reduce Intentional Binding. *Social Cognition* 43(4), 331-355.

Bao, Y. B., Li, X. & **Kuperman, V.** (2025). The Eye Movement Database of Passage Reading in Vertically Written Traditional Mongolian. *Scientific Data* 12, 499.

Brodbeck, C., Hannagan, T. & Magnuson, J.S. (2025). Recurrent Neural Networks as Neuro-Computational Models of Human Speech Recognition. *PLOS Computational Biology* 21(7), 1-21.

Chaposhloo, M., McKinnon, M.C., Kearney, B.E., Shaw, S.B., Lanius, R.A. & **Becker, S.** (2025). Unraveling trauma Memory: Differential Roles of Anterior and Posterior Hippocampus in Trauma Recall in Post-traumatic Stress Disorder and Its Dissociative Subtype. *Neuroimage Reports* 5(3), 100279.

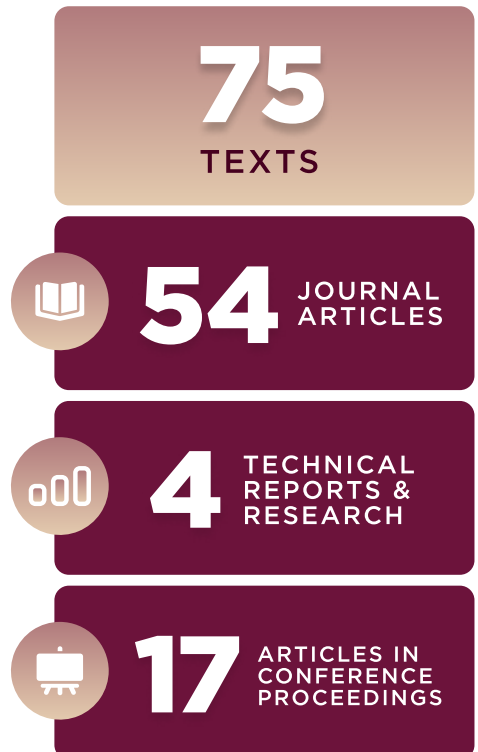
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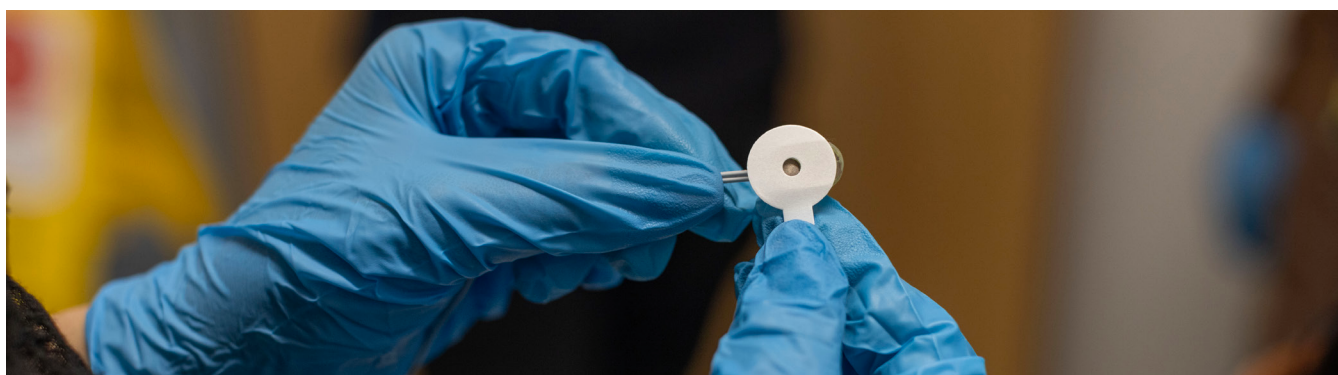


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- Smith, S., Dong, A., Carette, J. & **Noseworthy, M.D.** (2025). State of the Practice for Medical Imaging Software Based on Open Source Repositories. *Critical Reviews in Biomedical Engineering* 53(6), 1-23.
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Fink, L., Flannery, M. & Saxena, S. (2025). Visual Art, Spoken Voices, and the Physiology of Preference. *Art & Perception* 13(4), 333.



CONFERENCE PROCEEDINGS & ABSTRACTS (17)

Amador-Tejada, A., Danielli, E., Kumbhare, D.A. & **Noseworthy, M.D.** (2025). Defining a Baseline of Healthy Brain Function Using rs-fMRI: A Pilot Characterization of Six rs-fMRI Analyses. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S384-S386, 239. (Poster)

Armstrong, M., Amador-Tejada, A. & **Noseworthy, M.D.** (2025). Brain Resting-State fMRI Signal Complexity in Temporal Lobe Epilepsy (TLE) Patients. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S823-S825, 531. (Poster)

Biggs, A. & Embick, D. (2025). Restrictions on the Formation of Stative Passives. In Duygu Demiray, Roger Cheng-yen Liu, and Nir Segal (eds.), *NELS 55: Proceedings of the Fifty-fifth Annual Meeting of the North East Linguistic Society*, 81-91.

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CONFERENCE PROCEEDINGS & ABSTRACTS (CONT)

Saxena, S., Visram, A., Lobo, N., Mirza, Z., Khan, M., Pirabakaran, B., Nguyen, A., & **Fink, L.** (2025). SocialEyes: Scaling Mobile Eye-tracking to Multi-person Social Settings. *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (CHI '25)*. Apr. 26-May 1, Yokohama, Japan, Article 751, 1–19.

Sharma, B., Koelink, E.S., DeMatteo, C., Timmons, B.W. & **Noseworthy, M.D.** (2025). Exercise-Induced Changes in Functional Brain Activity in Children with Concussion. 15th World Congress on Brain Injury Abstracts, *Brain Injury* 39 (sup1), 219.

Sharma, B., Koelink, E.S., DeMatteo, C., Timmons, B.W. & **Noseworthy, M.D.** (2025). Exercise-Induced Changes in Resting-State Functional Brain Activity in Children with Concussion. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S797, 512. (Poster)

Simard, N. & **Noseworthy, M.D.** (2025). Personalized Assessment of Concussion-Induced Cerebellar Injury Using Diffusion Tensor Imaging (DTI). European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S257-S259, 163.

Stephens, L. & **Noseworthy, M.D.** (2025). Assessing Measurement Consistency of a Novel Anisotropic Phantom for Higher-Order Diffusion Tensor MRI Sequences. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S560-S562, 353. (Poster)

Tajik, M., Kumbhare, D.A. & **Noseworthy, M.D.** (2025). Preliminary Evidence That Cold-Induced Pain Disrupts Functional Connectivity in Knee Osteoarthritis Patients with Chronic Pain: An rs-fMRI Study. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S871, 565. (Poster)

Tavakkoli, M., van den Berg, D., Runderkamp, B.A., van der Zwaag, W., **Noseworthy, M.D.** & Caan, M.W.A. (2025). Accelerating Free-Breathing Liver MRI at 7T Using Recurrent Inference Machines. *International Society for Magnetic Resonance in Medicine (ISMRM)* 34, 6783. (Poster)

Zhu, C., Doyle, T.E. & **Noseworthy, M.D.** (2025). Masked Auto-Encoders for Classification of Concussion Using Imbalanced rs-fMRI Data. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S306-S308, 193.

TECHNICAL REPORTS (2)

Kučerová, I. & Co. (2025). Tehatiwennathétányons; Online Resource Hub for Community-Based Indigenous Adult Immersion Programs.

Noseworthy, M.D. & Konyer, N.B. (2025). MRI Acceptance Test (Canon Medical Systems 1.5T Fortian System). Lake of the Woods Hospital, Kenora, Ontario.

RESEARCH CREATIONS (3)

Flannery, M. & **Fink, L.** (2025). BEATmonitor (Version v0.2.250427) [Computer software].

Saxena, S., Visram, A., Lobo, N., Mirza, Z., Khan, M., Pirabakaran, B., Nguyen, A. & **Fink, L.** (2025). SocialEyes [Computer software].

Shi, J., Saxena, S. & **Fink, L.** (2025). AVOKE: An Open-source Web-Based Experimentation Toolbox for Evoking Audiovisual Responses [Computer software].



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PRESENTATIONS

Researchers have presented over **67** academic papers, posters, and invited talks over the course of 2025. Our researchers have presented their cutting-edge research in numerous high profile international conferences and academic institutions around the world, which speaks to the global impact that our researchers and laboratories have on their respective fields.

Biggs, A. (2025, April). Out of Control Unaccusativity. Keynote for MOTH Syntax Workshop, University of Toronto, Toronto, Ontario.

Biggs, A. & Embick, D. (2025, January). Access to Contextually Determined States in the Interpretation of English Stative Participles. Linguistic Society of America Annual Meeting 2025, Philadelphia, Pennsylvania.

Bonus, K., Flannery, M. & **Fink, L.** (2025, November). The Connection Between Maladaptive Music Listening and Adolescence: Foundational or Questionable? The 21st Annual Neuromusic Conference, Hamilton, Ontario. (Poster)

Brodbeck, C. (2025). How Does the Brain Recognize Spoken Words? Testing Computational Models of Speech Recognition with M/EEG Data. Department Of Psychology, Neuroscience & Behaviour, McMaster University, Hamilton, Ontario.

Bulakh, M. & **Pape, D.** (2025, June). Obstruent Coarticulation Patterns of Ukrainian Speakers' L1 and L2 Production: An Ultrasound Study. 6th Phonetics and Phonology in Europe conference (PaPE), Palma de Mallorca, Spain.

Cameron, D. Gokarn, Z., Monter, L., **Trainor, L. J.**, Bosnyak, D., Dotov, D. & Witek, M. (2025, July). How Rhythm, Bass, and Social Movement Combine to Motivate Group Dancing at an Electronic Dance Music Concert. The 20th Rhythm Perception and Production Workshop, Jyväskylä, Finland.

Chr. Hansen, N. Mavrolampados, A., Mason, B., **Fink, L.**, Saarikallio, S. & Howlin, C. (2025, July). Who Listened to What During the Pandemic? The 18th International Conference on Music Perception & Cognition (ICMPC18-SIMCAM 17), Sao Paulo, Brazil. (Poster)

Edalati, M., Psaris, M., Gallard, A., Foulon, A., Wallois, F., **Trainor, L. J.** & Moghimi, S. (2025, November). The Influence of Tempo on Neural Encoding of Rhythmic Hierarchy in Neonates. Audidev: Auditory Development Workshop, Bruxelles, Belgium.

Edalati, M., Wallois, F., Gallard, A., Foulon, A., **Trainor, L. J.** & Moghimi, S. (2025, July). The Influence of Tempo on Neural Encoding of Rhythmic Hierarchy in Neonates. The 20th Rhythm Perception and Production Workshop, Jyväskylä, Finland.

Ferreira, R. & **Kuperman, V.** (2025, December). Reading Brazilian Portuguese Across Genres: Insights from a Passage-Reading Eye-Movement Corpus. The Latin American Conference for Eye Movements, Pontifical Catholic University of Valparaíso, Chile

Fink, L. (2025, October). Neuroscience of Music: A Brief Introduction. University Honors Program, Alumni Talk Series, University of Cincinnati, OH, USA.

Fink, L. (2025, September). Analyzing Data with SocialEyes. Montreal Open Tools Symposium, Montréal Neurological Institute & McGill University, Montréal, Québec, Canada.

Fink, L. (2025, September). Social Eye-Tracking and Cardiac Monitoring in Diverse Everyday Contexts. Keynote at Montreal Open Tools Symposium, Montréal Neurological Institute & McGill University, Montréal, Québec, Canada.

Fink, L. (2025, June). A Brief Tour of the Social Neuroscience of Music. Laryngology Conference, The Mount Sinai Hospital, New York, NY, USA.

Fink, L. (2025, April). Broadening the Toolset of Neuromusic Research. BRAMS-CRBLM Lecture Series, Université de Montréal, Québec, Canada.

Fink, L. (2025, January). Roundtable Discussion Panelist. Open Research in Practice. Research Data Management Community of Practice, McMaster University Library, ON, Canada.

Fink, L., Flannery, M. & Saxena, S. (2025, August). Visual Art, Spoken Voices, and the Physiology of Preference. The Visual Science of Art Conference, Wiesbaden, Germany.

Flannery, M. & **Fink, L.** (2025, July). Multi-Person Photoplethysmography Using Open-Source Smartwatch Technology: Development, Validation, and Applications in Naturalistic Music Listening. The 18th International Conference on Music Perception & Cognition (ICMPC18-SIMCAM 17), Sao Paulo, Brazil.

Georlette, B., Edalati, M., Richard, N.C., Román-Caballero, R., **Trainor, L. J.**, Lense, M.D., Tillmann, B., Wallois, F. & Moghimi, S. (2025, November). Investigating Infants' Responses to Infant-Directed Communication Using Eye-Tracking. Audidev: Auditory Development Workshop, Bruxelles, Belgium.

Georlette, B., Edalati, M., Román-Caballero, R., **Trainor, L. J.**, Tillmann, B., Wallois, F. & Moghimi, S. (2025, July). Investigating Infants' Responses to Infant-Directed Singing: A Visual Behavioural Study Using Eye-Tracking. The 20th Rhythm Perception and Production Workshop, Jyväskylä, Finland.

Griska-MacPhee, B. & **Kuperman, V.** (2025, June). Morphology in the Corner of Your Eye. The Mental Lexicon meeting. Montreal, Canada. (Poster)

Iorio, C., Edalati, M., Georlette, B., Brassieur, C., **Trainor, L. J.**, & Moghimi, S. & Tillmann, B. (2025, November). Exploring Rhythm Processing in Early Development: Let's Drum and Dance Together. Audidev: Auditory Development Workshop, Bruxelles, Belgium.

Klein, L. & **Trainor L. J.** (2025, July). A Data-Driven Approach to Measuring Musical Group Flow Experiences. The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Kučerová, I. (2025, November). Not All Probes Are Equal. The Agreement Series, Center for Research in Syntax, Semantics, and Phonology (CRISSP), KU Leuven, Leuven, Belgium. (Virtual)

PRESENTATIONS (CONT)



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Kučerová, I. & Onea, E. (2025, September). NP 2 Copular Agreement in Czech Presentational Contexts. The 20th Annual meeting of the Slavic Linguistics Society, University of Verona, Verona, Italy.

Kučerová, I. & Onea, E. (2025, September). What You Are Presented With Is Not What You Predicate Over. The 2nd International Workshop on the Syntax of Predication and Modification, Hungarian Research Centre for Linguistics, Budapest, Hungary.

Kučerová, I. & Onea, E. (2025, June). NP2 Copular Agreement in Presentational Contexts. The Olomouc Linguistics Colloquium (OLINCO), Palacký University, Olomouc, Czech Republic.

Kučerová, I. & Onea, E. (2025, May). NP2 Copular Agreement Revisited: Evidence from Presentational Contexts. The Leiden/Bielefeld Workshop on Comparative Syntax, University of Bielefeld, Bielefeld, Germany.

Kučerová, I. & Onea, E. (2025, May) What Is There to Agree With? Evidence from Presentational Copular Clauses. The Referential Structure in Communication: International Conference on Language and Communication, University of Graz, Graz, Austria.

Kuperman, V. (2025, November). Linguist Is as Linguist Does: A Comparative Study on the Employment and Income of Graduates from Linguistics Programs in Canada. The Department of Linguistics at University of Essex, UK.

Kuperman, V. (2025, June). Gaining a Macroscopic View of Reading Behavior from Multilingual Eye-Movement Corpora. The Mental Lexicon meeting, Montreal, Canada.

Kuperman, V. (2025, April). How to Study Reading Comprehension and Fluency in the First and Second Language Using Eye-Tracking Data. The Institute for Literature and Language Science, PUCV, Chile.

Kuperman, V. (2025, March). What Is Universal and What Is Specific in Cross-Linguistic Reading Behavior. The Formal Colloquium of the Cognitive and Comparative Psychology program of City University of New York, New York, USA.

Kuperman, V., Ibanez, R. & Kaakinen, J. (2025, December). Emotional Engagement with the Text Influences Eye Movement Behavior and Text Comprehension Across Languages. The Latin American Conference for Eye Movements, Pontifical Catholic University of Valparaíso, Chile

Kyriakidou, S., Schmidtke, D. & **Moro, A. L.** (2025, July). From Movement to Meaning: Eye-Movement Measures as Predictors of L1 and L2 Reading Comprehension. Thirty-second annual meeting of the Society for the Scientific Study of Reading, Calgary, AB, Canada.

Kyriakidou, S., Schmidtke, D. & **Moro, A. L.** (2025, June). Individual Differences in Sensitivity to Grapheme-to-Phoneme Transparency in Second Language Lexical Processing: An Eye-Tracking Study. Thirteenth international conference on the Mental Lexicon, Montréal, QC, Canada.

Liu, G., Schlichting, J. & **Fink, L.** (2025, July). The Self-Reference Effect in Science Communication: Does Personal Relevance Drive Social Media Engagement? The 13th Annual McMaster Conference on Education and Cognition, Hamilton, ON, Canada. (Poster)

Luo, Z. & **Biggs, A.** (2025, April). Big and Small as Dimension-Less Degree Modifiers. The 43rd West Coast Conference on Formal Linguistics (WCCFL 43), University of Washington, Seattle, Washington.

Miguel, M., Cannon, J. & **Trainor, L. J.** (2025, July). Does Switching Partners Enhance Non-Verbal Communication in Partner Dancing? The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Nguyen, A., Janata, P. & **Fink, L.** (2025, November). Predicting Subjective States from Multimodal Data. The 21st Annual Neuromusic Conference, Hamilton, ON, Canada. (Poster)

Noseworthy, M.D. (2025, December). MRI of Other Nuclei: A" How To" Guide. Annual Physics Symposium: University of Toronto Neuroradiology Fellowship Program, Toronto, Ontario.

Noseworthy, M.D. (2025, September). The New Frontier of MRI: Imaging The Lung. General Electric Healthcare: MR User Symposium 2025, Niagara-on-the-Lake, Ontario, Canada.

Noseworthy, M.D. (2025, September). The Use of AI in Grading mTBI. General Electric Healthcare: MR User Symposium 2025, Niagara-on-the-Lake, Ontario, Canada.

Noseworthy, M.D. (2025, June). Personalized Pain Assessment Using Brain Imaging. Michael G. DeGroote Institute for Pain Research & Care: Annual Research Meeting, Hamilton Ontario.

PRESENTATIONS (CONT)

Noseworthy, M.D. (2025, June). Understanding How MRI Works. Guyana National Imaging Conference, Georgetown, Guyana.

Paul, M-A. & **Kuperman, V.** (2025, June). Revisiting Positivity Bias in Aging: Insights from Word Valence Rating Times. The Mental Lexicon meeting. Montreal, Canada. (Poster)

Pazdera, J.K., **Trainor, L.J.** & Xiao, N.G. (2025, July). Expressions: Unlocking the iPhone's Potential for Real-Time Facial Expression Tracking. The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Ripley, S. & **Trainor, L. J.** (2025, July). Bidirectional Coordination of Caregiver and Infant Behaviour During Infant-Directed Singing and Speech. The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Román-Caballero, R., Psaris, M., Xiao, G., Lupiáñez, J. & **Trainor, L. J.** (2025, October). Visual Attention of Infants in Early Interactions: Differences in Early Processing of Music and Language. The Timing Research Forum Conference, Tokyo, Japan.

Rothe-Neves, R., Lana, N., Leite, M., Carvalho, B. & **Kuperman, V.** (2025, December). Visual Attention and Novel Word Learning: New Evidence from First- and Second-Language Learners of Brazilian Portuguese and English. The Latin American Conference for Eye Movements, Pontifical Catholic University of Valparaíso, Chile.

Sakamoto, S. & **Trainor, L.J.** (2025, October). Temporal Jitter in Music Reveals Robust Early Stream Formation and Enhanced Attentional Selection via Attention Recruitment. The Timing Research Forum Conference, Tokyo, Japan.

Saxena, S. & **Fink, L.** (2025, August). An Automated Method for Multi-Person Mobile Eye-Tracking in Natural Contexts Involving Shared Gaze Goals. The European Conference on Visual Perception (ECVP47), Mainz, Germany.

Saxena, S., Uppal, A., Lee, M.S., Cauwenberghs, G. & **Fink, L.** (2025, June). In-Ear EEG and Eye-Tracking to Study Audiovisual Interactions in Naturalistic Settings. CogHear Workshop, University of Maryland, College Park, MD, USA.

Schlichting, J. & **Fink, L.** (2025, July). How Social Justice Advocacy Through Music Performance Influences Audiences' Charitable Attitudes and Behaviours. The 18th International Conference on Music Perception & Cognition (ICMPC18- SIMCAM 17), Sao Paulo, Brazil.

Schmidtke, D., Kyriakidou, S. & **Moro, A.L.** (2025, July). Post-Bridging Program Reading Skills as Predictors of Academic Performance in EAL Students: A Comparison of Bridging Program and Direct-Entry Students. Thirty-Second Annual Meeting of the Society for the Scientific Study of Reading, Calgary, AB, Canada

Service, E. (2025, May). Researching Work Tasks That May Be Affected by Second Language Use. Interdisciplinary Perspectives on Changing Workplaces: Inaugural conference for the launch of McMaster Centre for Research on Employment and Work (MCREW), McMaster University, Hamilton, Ontario.

Trainor, L. J. (2025, November). The Dynamics of Musical Interactions: From Caregiver-Infant Bonds to Collective Audience Experiences. University of Granada, Granada, Spain.

Trainor, L. J. (2025, October). How Rhythm and Timing Structure Experience. Georgian Triangle Lifelong Learning Institute. Collingwood, ON, Canada.

Trainor, L. J. (2025, October). How Rhythm and Timing Structure Experience from Music to Social Interaction. Guelph Third Age Learning. Guelph, ON, Canada

Trainor, L. J. (2025, October). The Musical Infant: How Rhythm Structures Early Neural, Communicative and Social Development. The Glenn Gould Foundation World Congress, Royal Conservatory of Music, Toronto, Canada.

Turkstra, L. (2025, October). Management of Communication and Swallowing after Stroke. World Stroke Organization. (Virtual)

Turkstra, L. (2025, September). Communication Developments in Adolescence: The Need for a True Lifespan Approach to Rehabilitation of Language and Cognitive-Communication Disorders. 19th Annual Eleanor M. Saffran Conference on Cognitive Neuroscience & Rehabilitation of Communication Disorders, Philadelphia, PA.

Turkstra, L. (2025, April). What Is Happening in Pediatric Brain Injury Rehabilitation? Talk with the Experts. Center for Brain Injury Research and Training, University of Oregon.

Turkstra, L. (2025, March). Strategy-Based Rehabilitation for Canadian Veterans with mTBI: Results of a feasibility RCT. International Brain Injury Association World Congress, Montreal, Quebec.

Turkstra, L. (2025, February). Social Cognition and Communication in Acquired Brain Injury in Adolescents and Adults. Traumatic Brain Injury Model Systems Neuropsychology Special Interest Group, International Neuropsychological Society 53rd Annual Meeting.

Verno-Lavigne, E., Cui, M.E., Saxena, S., **Fink, L.** & Herrmann, B. (2025, February). Eye Movement Decreases During Challenging Listening Conditions: Evidence from Mobile Eye-Tracking Glasses. LOVE Conference 2025, Niagara Falls, ON, Canada.

Wei, Y., Stoneac, C., Slevcb, L.R., Farooqi-Shaha, Y. & **Brodbeck, C.** (2025, September). Spatiotemporal Signature of Morphosyntactic Planning in English Sentence Production. Society for the Neurobiology of Language 17th Annual Meeting, Gallaudet University, Washington DC.

Wei, Y., Stoneac, C., Slevcb, L.R., Farooqi-Shaha, Y. & **Brodbeck, C.** (2025, March). Spatiotemporal Signature of Morphosyntactic Planning in English Sentence Production. 38th Annual Conference on Human Sentence Processing, University of Maryland, College Park, Maryland.

Wood, E., Miguel, M. & **Trainor, L. J.** (2025, July). The Influence of Audience Presence on Expressive Performance in a Professional Pianist. The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Xing, S., **Fink, L.**, Bosnyak, D. & Cameron, D. (2025, November). How Does Low Bass Make Us Move? Investigating the Sensory and Physiological Mechanisms of Very Low Frequencies' Effect on Movement and Pleasure. The 21st Annual Neuromusic Conference, Hamilton, ON, Canada. (Poster)

GRANTS

2025 as another big year for ARiEAL and ARiEAL researchers as we obtained more funding for our research, knowledge mobilization, and training activities. ARiEAL and ARiEAL researchers secured 16 new grants, totalling more than **\$4 million**, as Principal Investigator and co-applicants from both internal and external sources, adding to the **\$ 15 million** we won in 2024. Funding sources include McMaster University, the Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC), Social Sciences and Humanities Research Council (SSHRC), National Institutes of Health (NIH), Southern Ontario Pharmaceutical and Health Innovation Ecosystem, as well as various other foundations and institutions.

Biggs, A. & Paparounas, L. Building Argument Structure at the Interfaces and in Syntax (BASIS) Workshop. Association canadienne de linguistique/Canadian Linguistic Association Conference Support Fund, \$800, 2025-26.

Brodbeck, C. Natural Conversation in a Cognitive Architecture. Ontario Centre of Innovation, \$235,693, 2025-27.

Brodbeck, C. Neuro-Computational Foundation of Human Speech Recognition. NSERC Discovery Grant, \$222,500, 2025-30.

Dagenais, M. ARiEAL Research Magazine, Volume 3: A Student-Run Languages Sciences International Journal. Paul R. MacPherson Institute for Leadership, Innovation, and Excellence in Teaching (McMaster University), Student Partners Program, \$2,000, 2025

Dagenais, M. The ARiEAL Alumni Mentorship Program. Paul R. MacPherson Institute for Leadership, Innovation, and Excellence in Teaching (McMaster University), Student Partners Program, \$2,000, 2025

Escabí, M. (PI) & **Brodbeck, C (Co-PI)**. CRCNS: Predictive Models of Human Speech Recognition in Natural Environmental Noise. National Institutes of Health, US\$1,604,854, 2025-30.

Fink, L., Palumbo, A. (PI), Ripollés, P. (PI) & Turry, A. Evaluating Social Communication among Autistic Children in Music Therapy. Renée Fleming Neuroarts Investigator Award, Neuroarts Blueprint Initiative. Operating Grant, \$25,000 USD, 2025-26

Fink, L. SocialEyes. Faculty of Science Pre-Seed Pitch Competition, McMaster University, \$30,000, 2026.

Kučerová, I. Mobilizing Language Scientists for a More Equitable and Responsible AI. Office of the Vice-President, Research (McMaster University), The International Initiative MicroFund (IIMF) Award, \$5,000, 2025-26.

Kučerová, I. Nominal Integration in Associative, Comitative and Accompaniment Structures: A Comparative Syntax Study. Social Sciences and Humanities Research Council of Canada, Insight Grant, \$221,063, 2025-30.

Kučerová, I. (PI), Brodbeck, C., Gaston, P., Kuperman, V. & Postma, M. (Collaborators). Closing the Digital Divide: Accessibility, Employability, and Safety. Social Sciences and Humanities Research Council of Canada, Destination Horizon, \$30,000, 2025-26.

Noseworthy, M.D. Advanced Evaluation of Diffusion Tensor Imaging (DTI) Phantoms for Magnetic Resonance Imaging (MRI). Southern Ontario Pharmaceutical and Health Innovation Ecosystem, \$135,000, 2025.

Noseworthy, M.D., Farncombe, T. & Byun S. Multimodal Applications of Holmium-166 (¹⁶⁶Ho). McMaster Planetary Health Seed Fund, \$80,000, 2025-27.

MacKillop, J., Frey, B., Lee, J., Goswami, I., **Noseworthy, M.D.** & Marcucci M. Building World-Class Brain Health Infrastructure and Intervention Capacity: The Hamilton Integrated Brain Health Platform. Juravinski Research Institute, \$1,500,000, 2025-27.

Trainor, L. Science and Arts Youth Outreach, Hamilton Community Foundation, \$10,900, 2025-2026.

Trainor, L. CIFAR Research Fellowship, \$30,000, 2025- 2026.



Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada



Finnish Cultural
Foundation

IMPACT

Every year, ARIEAL strives to produce ethically conscious research that engages with a diverse global scientific community and impacts our broader society. We are also committed to producing research that harnesses the strengths of our collaborative and interdisciplinary community. Our trainees have particularly been at the forefront of ARIEAL's research output as several of our undergraduate, graduate, and postdoctoral trainees as well as senior research associates and other affiliated scholars have published articles in high-impact journals, presented their work at international conferences, and won prestigious research grants and awards.

Thanks to funding from the MacPherson Institute, we published the third volume of the **ARIEAL Research Magazine**, expanding its reach beyond McMaster by

featuring contributions from researchers at other institutions. We also built on the success of the **ARIEAL Outreach Program for Underrepresented High School Students** by bringing our program "on the road" through live virtual workshops and the development of more online learning resources. These resources included a virtual tour of the ARIEAL lab as well as a training video introducing EEG research methods. Together, these initiatives enabled us to connect with more students across the region and introduce more students to the language sciences concepts and methodologies.

In 2025, we continued with professional development initiatives designed to better prepare our trainees for future careers. In particular, we received more funding from the **Training, Equipment, and Renewal Fund** to upgrade our

equipment, technology, and software in several laboratory spaces to ensure that undergraduate and graduate students can practice the hands-on skills they will be required to use in research and industry. Integrating these new technologies will expand experiential learning opportunities and further familiarize students with the digital skillsets and tools required in their future careers. We also expanded the **Life after ARIEAL Speaker and Video Series**. While the series continues to highlight the career paths of ARIEAL alumni and the role their training in the Language Sciences has played in their professional success, we also introduced more interactive, skills-based sessions focused on career readiness, including a workshop on translating ARIEAL-acquired skills for industry, hosted by our former trainee **Heather Wild**.



Speaker Series



Vocal Communication Beyond the Words

with

Dr. Pauline Larrouy-Maestri,
Max Planck Institute for Empirical
Aesthetics

**Thursday, November 20, 1:30-2:30pm,
LRW 4001**

The voice, whether human- or AI-generated, conveys multiple layers of information, broadcasting emotions and intentions far beyond the literal meaning of the words. Decades of research have identified key acoustic features that carry this information, yet a deterministic mapping between these acoustic cues and specific meanings remains elusive. Please join our special guest, **Dr. Pauline Larrouy-Maestri**, a senior researcher at the Max Planck Institute for Empirical Aesthetics in Frankfurt, Germany, as she presents recent work tackling this puzzle. She will specifically discuss the role of pitch in inferring communicative intent and explore how individual differences among listeners can lead to misunderstandings in everyday communication.



Learning Series



Life after ARIEAL with **Heather Wild**

**Wednesday, January 29, 3:30pm
LRW 4001**



Heather Wild completed her Masters in the Cognitive Science of Language program in 2023. During her studies, she was a member of the Reading Lab and focused on big data analytics and language learning. Heather used her skills from the Cognitive Science of Language program as a freelance technical editor, a user experience researcher and prompt engineer at the tech start-up Lingvist, and currently as a business analyst at Stryker Canada.

SPEAKER & LEARNING SERIES

The year 2025 saw many more in-person learning and speaker events at ARIEAL. We continued our tradition of inviting world-renown researchers, such as **Dr. Renan Ferreira, Dr. Stephen Henhawk, Dr. John Whitman, Dr. Rui Rothe-Neves, and Dr. Pauline Larrouy-Maestri**. 2025 also saw the return of **Dr. Marisa Young** and **Dr. Loa Gordon**, who, some will remember, visited us in 2024 to share findings from the World Mental Health McMaster Study. **Drs. Young and Gordon** play a key role in the WHO World Mental Health International College Student's (WMH-ICS) landmark study based out of Harvard Medical School on the contributors to and prevalence of mental health problems among university students. Titled "A Discussion on Student Mental Health: What We Learn from Data and Dialogue," **Dr. Young** and **Dr. Gordon** shared updated results from their study. As part of the program, our very own ARIEAL trainee, **Audrey Ho**, led a workshop on her strategies for managing and navigating grad school-related challenges.

Through our **Brown Bag series**, we also encouraged our own community of researchers and trainees at McMaster to share their work-in-progress, allowing all to workshop their work for some constructive feedback from our team. In particular, **Dr. Hamidreza Mahyar** shared insights from his 20 years in AI, highlighting projects like developing generative models for drug discovery, building a recommendation engine for a mental health app, and enabling AI-powered tools for language preservation in Indigenous and minority communities. Using case studies from collaborations with organizations like BASF and Infineon Technologies, he demonstrated how interdisciplinary research can foster ethical AI deployment, bridge global research efforts, and create practical societal benefits.

In 2025, we also continued to organize and host learning series events for our trainees, with a further emphasis on their professionalization and career growth. Particularly, we continued with our very popular **Life after ARIEAL Networking**

Series. The goal of this series is to invite ARIEAL Alumni that have been doing great things since graduating to talk to our trainees. Throughout this series, our guests talked about their current jobs, how their degree in Language Sciences helped them find their job and is helping them in their current role. In 2025, we welcomed back a very popular trainee: **Heather Wild**. Heather completed her Masters in the Cognitive Science of

Language program in 2023. During her studies, she was a member of the Reading Lab and focused on big data analytics and language learning. Heather used her skills from the Cognitive Science of Language program as a freelance technical editor, a user experience researcher and prompt engineer at the tech start-up Lingvist, and currently as a business analyst at Stryker Canada.

ARiEAL Presents

SMARTWATCHES IN RESEARCH

NEW TECHNOLOGY
APPLIED TO CURRENT
RESEARCH!



Guest Speaker:
Maya Flannery
PhD Student

LRW 4018
Wednesday, November 12th
3:30PM - 4:30PM

COLLABORATIVE RESEARCH & TRAINING INITIATIVES

The year 2025 once again highlighted the value of our collaborative model. This approach continues to generate impactful research, while also playing a vital role in enhancing the academic and professional development of our students. First, our researchers and trainees co-authored numerous journal articles and conference papers, which resulted from years of collaborative research efforts between our various labs. For example, **Dr. Victor Kuperman** collaborated with **Dr. Daniel Schmidtke**, a Research Associate in the MELD Bilingualism Lab, on several research projects published in high-profile scientific journals, including an article titled “DerLex: An eye-movement database of derived word reading in English” in *Behavior Research Method*. **Dr. Kuperman’s** and **Dr. Fink’s** labs

also collaborated on an innovative project titled “Reading in Museums: Investigating Eye Movements Using Mobile Eye Tracking.” The design of textual signage plays a significant role in shaping visitor experiences in galleries and museums, and this study examines how textual and visual information influences visitors’ engagement within exhibit spaces. Working alongside a team of ARIeAL research assistants, visitors to the McMaster Museum of Art were invited to wear mobile eye-tracking glasses while navigating an exhibit featuring historical texts and objects. Participants then completed a survey collecting demographic information, learning outcomes, and feedback on their overall experience. The findings provided valuable insights into the impact of labels on users’ learning experience in

museums, and the link between the visual properties of museum objects and user choice in navigating exhibit spaces.

This collaborative model also led to large-scale projects that tackle the issue of responsible AI and equity. For example, a team composed of **Drs. Kučerová, Brodbeck, Gaston, and Kuperman** have been working closely with European partners on a Horizon Europe application, even receiving funding from Social Sciences and Humanities Research Council of Canada’s Destination Horizon program for a project titled “Closing the digital divide: Accessibility, employability, and safety.” ARIeAL’s collaborative environment supports research and training that pushes beyond traditional disciplinary boundaries and draws on the strengths of our many labs.



AI-BASED RESEARCH & PARTNERSHIPS

2025 was another important year for ARIeAL research and partnerships, particularly in the realm of **responsible Artificial Intelligence (AI)**. AI technology is not only here to stay, but it is projected to grow and become a central component of our lives. At ARIeAL, we fully anticipated this growth and recognized that, as language scientists, we have an important role to play in further developing this technology and understanding its societal/human implications. As such, in 2025, members of our team collaborated on large-scale projects that tackle the issues related to AI.

ARIeAL is actively advancing knowledge in Artificial Intelligence (AI), with a particular emphasis on responsible AI and its implications on Canadian workforce productivity. Recognizing

the central role of language in human-machine interaction, we are fostering a collaborative research environment that integrates expertise in cognitive science, linguistics, and AI. Supported by an extensive network of academic, industry, and community partners, our research aims to develop and validate the accessibility and efficacy of reskilling solutions (i.e. software and digital training programs) that can help Canada build the highly skilled workforce capable of adapting to and competing in a rapidly evolving AI-enabled economy. With funding from the **Social Sciences and Humanities Research Council of Canada** and **McMaster University**, we have been collaborating closely with European partners on projects focused on developing language-centred verification, evaluation, and

usability methodologies of digital products and solutions. This work aligns closely with emerging government priorities in both Canada and Europe.

Our researchers are also leveraging AI in their own award-winning scholarship. For example, Dr. Victor Kuperman was recently awarded a prestigious Dorothy Killam Fellowship for his research on increasing literacy in Canada’s official languages. By using AI tools to create personalized language learning and reading materials tailored to an individual’s proficiency and linguistic background, Dr. Kuperman will collaborate with educators to co-design tools that facilitate language learning in Canada and internationally, with the goal of integrating these innovations into adult literacy education systems.

STEM & THE HUMANITIES

Leveraging our interdisciplinary team – that includes researchers from the humanities, science, engineering, and health sciences – and drawing on our STEM-based research methods and approaches, we have launched several outreach and knowledge mobilization initiatives that highlight and strengthen our position as the centre of STEM-focused research within the Faculty of Humanities. For example, in 2025, we once again partnered with **iStep**, a McMaster-based STEM enrichment program, to host three groups of Grade 12 students from Black communities in the Hamilton-Wentworth and Halton District School Boards. Through an experiential learning model that included hands-on EEG, eye-tracking, and ultrasound experiments, we introduced

students to Language Sciences. Students responded enthusiastically to the opportunity to engage directly with research technologies and were fascinated to see how ARIEAL language scientists use STEM-based methods to investigate humanities-centered questions. The program's success has led to a renewed collaboration with iStep.

We are also currently working on a **NSERC Promoscience** application to bring "The STEM-Side of Language Sciences" to classrooms in and around Hamilton. With support from the RCI Consolidated Support Fund, we organized earlier this year a major event designed to generate ideas and foster dialogue around the intersection of STEM (Science, Technology, Engineering, Mathematics, and Medicine) and the

Humanities. *Stronger Together: STEM and the Humanities* aimed to promote meaningful discussion about integrating STEM approaches into humanities research, while also highlighting the essential contributions of humanistic perspectives to STEM fields. This event featured a roundtable discussion on the role of the humanities in STEM and the application of STEM methods in humanities research. Participants included leading scholars from the Humanities, Social Sciences, Science, Engineering, and Health Sciences, along with a keynote address by Dr. Colin Phillips, who brought extensive experience directing the internationally renowned Language Science Center at the University of Maryland, an institution that exemplifies the integration of humanities, STEM, and health sciences research.

OUR TRAINEES' & AFFILIATED RESEARCHERS' IMPACT ON ACADEMIA

Our core members are not the only ones that are producing ground-breaking and innovative research, but our trainees and affiliated researchers are as well. In 2025, several of our trainees, from undergraduate students to postdoctoral researchers, research associates, and visiting researchers have published their research in several high impact journals and presented at numerous local and international conferences and community events. The following is a portion of this research.



PHOTO CREDIT: COLIN CZERNEDA C/O MCMASTER UNIVERSITY

JOURNAL ARTICLES (21)

Anwarzi, D., Becker, S. & Obhi, S. (2025). Agency in the Social World: Racial Bias Expectations and Perceptions of Social Identity Threat Reduce Intentional Binding. *Social Cognition* 43(4), 331-355.

Bao, Y. B., Li, X. & Kuperman, V. (2025). The Eye Movement Database of Passage Reading in Vertically Written Traditional Mongolian. *Scientific Data* 12, 499.

Cui, M.E., Verno-Lavigne, E., **Saxena, S.**, Fink, L. & Herrmann, B. (2025). Mobile Eye-Tracking Glasses Capture Ocular and Head Markers of Listening Effort. *JASA Express Letters* 5, 125202.

Czepiel, A., Fink, L., Scharinger, M., Seibert, C., Wald-Fuhrmann, M. & Kotz, S. (2025). Audio-Visual Concert Performances Synchronize an Audience's Heart Rates. *Annals of the New York Academy of Sciences*, 1543, 117-132.

Flaten, E. & Trainor, L.J. (2025). Investigating Generalizability of Top-Down Neural Representation of Metre in Infancy. *Journal of Cognitive Neuroscience*, 37, 2652-2675.

Kakonge, L., Boamah, H., Scratch, S.E., **Utomi, N.**, Hayee, A., Wolfe, D., Tomarchio, J., Gravel, K., Phoenix, M., Di Rezze, B., Wiseman-Hakes, C. & Turkstra L.S. (2025). Co-Designing a Survey on Computer-Mediated Communication Use among Adolescents with Acquired Brain Injury: Evaluating Participant Experiences in a Mixed-Methods Study. *Brain Impair*, 26(3), 1B25005.

Kakonge, L., Moghaddam, S., **Kim, M. (Sunny)**, Phoenix, M., Di Rezze, B., Wiseman-Hakes, C. & Turkstra, L. S. (2025). How are Adolescents with Acquired Brain Injury using Computer-Mediated Communication?: A Systematic Review of the Literature. *Disability and Rehabilitation*, 47(22), 5667-5687.

Kyröläinen, A. J., **Paul, M. A.** & Kuperman, V. (2025). Dataset on Cognitive and Social Well Being of Older Adults around the COVID-19 Pandemic: The CoSoWELL Corpus of Written Life Stories, release 2. *Data in Brief*, 111682.

Léger, S., Guinard, C., **Singh, S.**, Becker, S., Cunningham, J.E.A., Alda, M., Newman, A., Trappenberg, T. & Nunes, A. (2025). A New Measure of Mnemonic Discrimination Applicable to Recognition Memory Tests with Continuous Variation in Novel Stimulus Interference. *Brain and Behaviour* 15(6), e70303.

McWeeny, S., Trainor, L.J., **Armstrong, S.**, Bosnyak, D., Tawfik, H. & Bruce, I.C. (2025). Evaluating a Hearing Loop Implementation for Live Orchestra Music. *Ear and Hearing*, 46, 808-816.

Pazdera, J. & Trainor, L.J. (2025). Pitch Biases Sensorimotor Synchronization to Auditory Rhythms. *Scientific Reports* 15, 1-13.

Pazdera, J. & Trainor, L.J. (2025). Pitch-Induced Illusory Percepts of Time. *Attention, Perception, & Psychophysics*, 87, 545-564.

Perrier, M. F., Gamm, E., McCormick, A., Turkstra, L. S. & Flowers, H. L. (2025). Interprofessional Cognitive-Communication Rehabilitation Patterns for Children and Adolescents With Acquired Brain Injuries: A Retrospective Medical Chart Review. *American Journal of Speech-Language Pathology*, 34(5), 2748-2759.

Román-Caballero, R., Trujillo, L., Martín-Sánchez, P. del C., Trainor, L.J., Martín-Arévalo, E. & Lupiáñez, J. (2025). Relative Age Effect in Formal Music Training. *Cognitive Development*, 75, 101603.

Schmidtke, D., Van Dyke, J.A. & Kuperman, V. (2025). DerLex: An Eye-Movement Database of Derived Word Reading in English. *Behavior Research Method* 57(11), 1-15.

Siegelman, N., Schroeder, S., **Bao (Borojoon), Y.**... Kuperman, V. (2025). Wave 2 of the Multilingual Eye-Movement Corpus (MECO): New Text Reading Data Across Languages. *Scientific Data* 12(1), 1183.

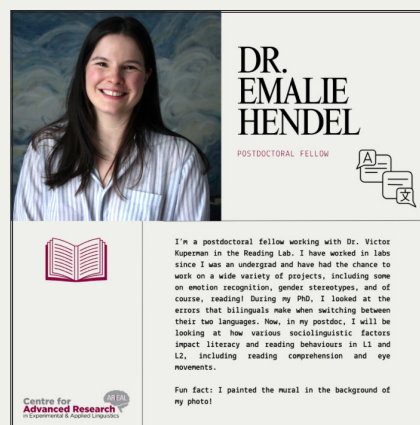
Simard, N., Fernback, A.D., Konyer, N.B., Kerins, F. & Noseworthy, M.D. (2025). Assessing Measurement Consistency of a Diffusion Tensor Imaging (DTI) Quality Control (QC) Anisotropy Phantom. *Magnetic Resonance Materials in Physics, Biology and Medicine* 38(3), 575-591.

Tajik, M. & Noseworthy, M.D. (2025). A Bioinformatic Study of Genetics Involved in Determining Mild Traumatic Brain Injury Severity and Recovery. *Biomedicine* 13, 2669.

Tavakkoli, M. & Noseworthy, M.D. (2025). A Review on Accelerated Magnetic Resonance Imaging Techniques: Parallel Imaging, Compressed Sensing, and Machine Learning. *Critical Reviews in Biomedical Engineering* 53(5), 71-85.

Tavakkoli, M., Runderkamp, B., de Buck, M., Strijkers, G., Noseworthy, M., Nederveen, A., Caan, M. & van der Zwaag, W. (2025). Compressed Sensing-Accelerated Free-Breathing Liver MRI at 7 T. *NMR in Biomedicine* 38, e70047

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Fink, L., **Flannery, M.** & **Saxena, S.** (2025). Visual art, spoken voices, and the physiology of preference. *Art & Perception* 13(4), 333.

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Flannery, M. & Fink, L. (2025). BEATmonitor (Version v0.2.250427) [Computer software].

Saxena, S., **Visram, A.**, **Lobo, N.**, **Mirza, Z.**, **Khan, M.**, **Pirabakaran, B.**, **Nguyen, A.** & Fink, L. (2025). SocialEyes [Computer software].

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CONFERENCE PROCEEDINGS & ABSTRACTS (12)

Amador-Tejada, A., Danielli, E., Kumbhare, D.A. & Noseworthy, M.D. (2025). Defining a Baseline of Healthy Brain Function Using rs-fMRI: A Pilot Characterization of Six rs-fMRI Analyses. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S384-S386, 239. (Poster)

Armstrong, M., Amador-Tejada, A. & Noseworthy, M.D. (2025). Brain resting-state fMRI signal complexity in temporal lobe epilepsy (TLE) patients. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S823-S825, 531. (Poster)

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Nowikow, C., Schulte, R.F., Vaeggemose, M. & Noseworthy, M.D. (2025). The Effect of k-Space Sampling Scheme on TSC Quantification Accuracy Using External Reference Phantoms. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S718-S720, 457. (Poster)

Saxena, S., Visram, A., Lobo, N., Mirza, Z., Khan, M., Pirabakaran, B., Nguyen, A. & Fink, L. (2025). SocialEyes: Scaling Mobile Eye-tracking to Multi-person Social Settings. *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (CHI '25)*. Apr. 26-May 1, Yokohama, Japan, Article 751, 1-19.

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Sharma, B., Koelink, E.S., DeMatteo, C., Timmons, B.W. & Noseworthy, M.D. (2025). Exercise-Induced Changes in Resting-State Functional Brain Activity in Children with Concussion. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S797, 512. (Poster)

Simard, N. & Noseworthy, M.D. (2025). Personalized Assessment of Concussion-Induced Cerebellar Injury Using Diffusion Tensor Imaging (DTI). European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S257-S259, 163.

Stephens, L. & Noseworthy, M.D. (2025). Assessing Measurement Consistency of a Novel Anisotropic Phantom for Higher-Order Diffusion Tensor MRI Sequences. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S560-S562, 353. (Poster)

Tajik, M., Kumbhare, D.A. & Noseworthy, M.D. (2025). Preliminary Evidence That Cold-Induced Pain Disrupts Functional Connectivity in Knee Osteoarthritis Patients with Chronic Pain: An rs-fMRI Study. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S871, 565. (Poster)

Tavakkoli, M., van den Berg, D., Runderkamp, B.A., van der Zwaag, W., Noseworthy, M.D. & Caan, M.W.A. (2025). Accelerating Free-Breathing Liver MRI at 7T Using Recurrent Inference Machines. *International Society for Magnetic Resonance in Medicine (ISMRM)* 34, 6783. (Poster)

Zhu, C., Doyle, T.E. & Noseworthy, M.D. (2025). Masked Auto-Encoders for Classification of Concussion Using Imbalanced rs-fMRI Data. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). *Magnetic Resonance Materials in Physics, Biology and Medicine* 38, S306-S308, 193.



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PRESENTATIONS (27)

Bonus, K., Flannery, M. & Fink, L. (2025, November). The Connection Between Maladaptive Music Listening and Adolescence: Foundational or Questionable? The 21st Annual Neuromusic Conference, Hamilton, Ontario. (Poster)

Bulakh, M. & Pape, D. (2025, June). Obstruent Coarticulation Patterns of Ukrainian Speakers' L1 and L2 Production: An Ultrasound Study. 6th Phonetics and Phonology in Europe conference (PaPE), Palma de Mallorca, Spain.

Cameron, D., Gokarn, Z., Monter, L., Trainor, L. J., Bosnyak, D., Dotov, D. & Witek, M. (2025, July). How Rhythm, Bass, and Social Movement Combine to Motivate Group Dancing at an Electronic Dance Music Concert. The 20th Rhythm Perception and Production Workshop, Jyväskylä, Finland.

Chr. Hansen, N. Mavrolampados, A., Mason, B., Fink, L., Saarikallio, S. & Howlin, C. (2025, July). Who Listened to What During the Pandemic? The 18th International Conference on Music Perception & Cognition (ICMPC18-SIMCAM 17), Sao Paulo, Brazil. (Poster)

Flannery, M. & Fink, L. (2025, July). Multi-Person Photoplethysmography Using Open-Source Smartwatch Technology: Development, Validation, and Applications in Naturalistic Music Listening. The 18th International Conference on Music Perception & Cognition (ICMPC18-SIMCAM 17), Sao Paulo, Brazil.

Georlette, B., Edalati, M., Richard, N.C., **Román-Caballero, R.**, Trainor, L. J., Lense, M.D., Tillmann, B., Wallois, F. & Moghimi, S. (2025, November). Investigating Infants' Responses to Infant-Directed Communication Using Eye-Tracking. Audidev: Auditory Development Workshop, Bruxelles, Belgium.

Georlette, B., Edalati, M., **Román-Caballero, R.**, Trainor, L. J., Tillmann, B., Wallois, F. & Moghimi, S. (2025, July). Investigating Infants' Responses to Infant-Directed Singing: A Visual Behavioural Study Using Eye-Tracking. The 20th Rhythm Perception and Production Workshop, Jyväskylä, Finland.

Griska-MacPhee, B. & Kuperman, V. (2025, June). Morphology in the Corner of Your Eye. The Mental Lexicon meeting. Montreal, Canada. (Poster)

Klein, L. & Trainor L. J. (2025, July). A Data-Driven Approach to Measuring Musical Group Flow Experiences. The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Kyriakidou, S., Schmidtke, D., & Moro, A. L. (2025, June). Individual Differences in Sensitivity to Grapheme-to-Phoneme Transparency in Second Language Lexical Processing: An Eye-Tracking Study. Thirteenth international conference on the Mental Lexicon, Montréal, QC, Canada.

Kyriakidou, S., Schmidtke, D., & Moro, A. L. (2025, July). From Movement to Meaning: Eye-Movement Measures as Predictors of L1 and L2 Reading Comprehension. Thirty-second annual meeting of the Society for the Scientific Study of Reading, Calgary, AB, Canada.

Liu, G., Schlichting, J. & Fink, L. (2025, July). The Self-Reference Effect in Science Communication: Does Personal Relevance Drive Social Media Engagement? The 13th Annual McMaster Conference on Education and Cognition, Hamilton, ON, Canada. (Poster)

Miguel, M., Cannon, J. & Trainor, L. J. (2025, July). Does Switching Partners Enhance Non-Verbal Communication in Partner Dancing? The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Nguyen, A., Janata, P. & Fink, L. (2025, November). Predicting Subjective States from Multimodal Data. The 21st Annual Neuromusic Conference, Hamilton, ON, Canada. (Poster)

Pazdera, J.K., Trainor, L.J. & Xiao, N.G. (2025, July). Expressions: Unlocking the iPhone's Potential for Real-Time Facial Expression Tracking. The International Conference on Music Perception and Cognition, São Paulo, Brazil.



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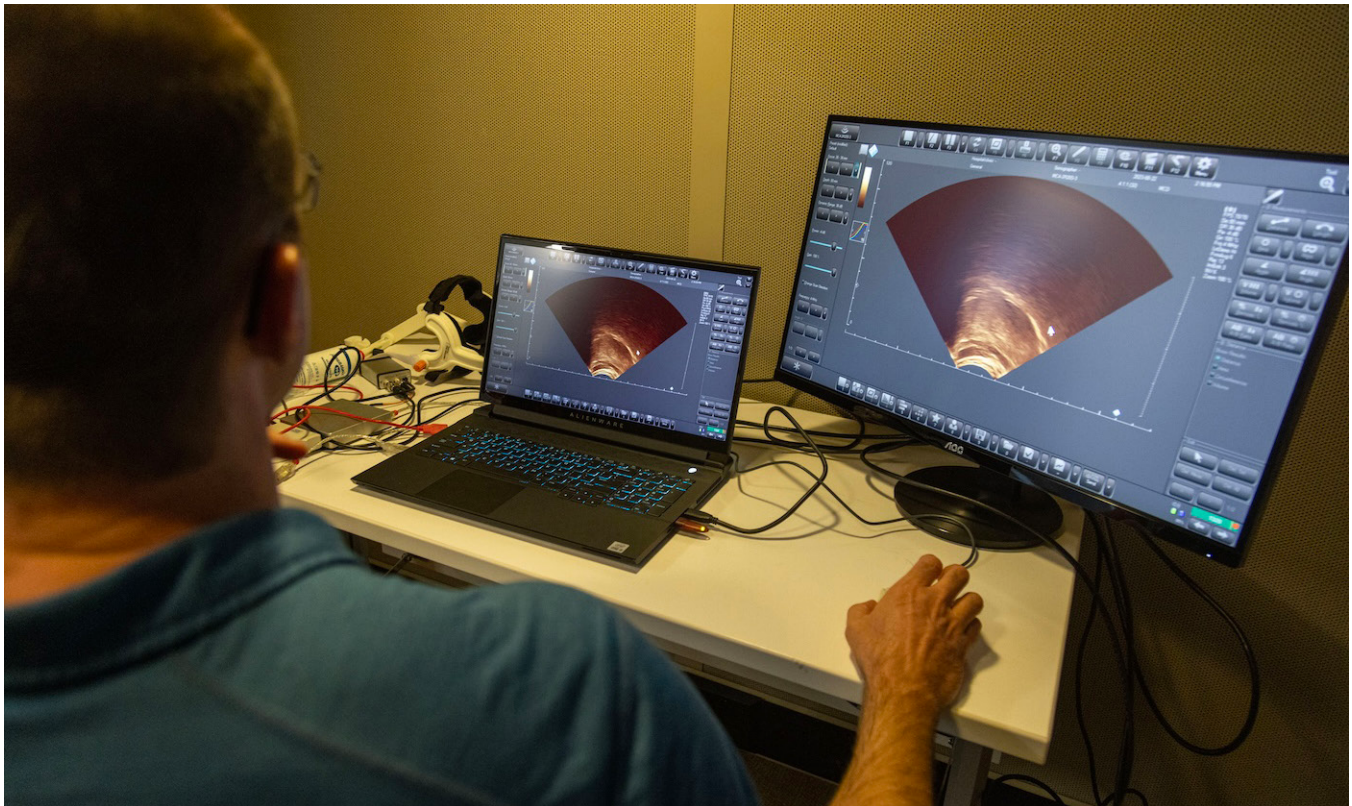


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Paul, M-A. & Kuperman, V. (2025, June). Revisiting Positivity Bias in Aging: Insights from Word Valence Rating Times. The Mental Lexicon meeting. Montreal, Canada. (Poster)

Román-Caballero, R., Psaris, M., Xiao, G., Lupiáñez, J. & Trainor, L. J. (2025, October). Visual Attention of Infants in Early Interactions: Differences in Early Processing of Music and Language. The Timing Research Forum Conference, Tokyo, Japan.

Rothe-Neves, R., **Lana, N.,** Leite, M., Carvalho, B. & Kuperman, V. (2025, December). Visual Attention and Novel Word Learning: New Evidence from First- and Second-Language Learners of Brazilian Portuguese and English. The Latin American Conference for Eye Movements, Pontifical Catholic University of Valparaíso, Chile.

Sakamoto, S. & Trainor, L.J. (2025, October). Temporal Jitter in Music Reveals Robust Early Stream Formation and Enhanced Attentional Selection via Attention Recruitment. The Timing Research Forum Conference, Tokyo, Japan.

Saxena, S. & Fink, L. (2025, August). An Automated Method for Multi-Person Mobile Eye-Tracking in Natural Contexts Involving Shared Gaze Goals. The European Conference on Visual Perception (ECVP47), Mainz, Germany.

Saxena, S., Uppal, A., Lee, M.S., Cauwenberghs, G. & Fink, L. (2025, June). In-Ear EEG and Eye-Tracking to Study Audiovisual Interactions in Naturalistic Settings. CogHear Workshop, University of Maryland, College Park, MD, USA.

Schlichting, J. & Fink, L. (2025, July). How Social Justice Advocacy Through Music Performance Influences Audiences' Charitable Attitudes and Behaviours. The 18th International Conference on Music Perception & Cognition (ICMPC18- SIMCAM 17), Sao Paulo, Brazil.

Schmidtke, D. (2025, November). Language Skills and Academic Performance in International Students: Comparing Direct-Entry and English Bridging Program Pathways. Centre for Advanced Studies in Language and Education (CASLE), University of York, York, UK.

Schmidtke, D., Kyriakidou, S. & Moro, A.L. (2025, July). Post-Bridging Program Reading Skills as Predictors of Academic Performance in EAL Students: A Comparison of Bridging Program and Direct-Entry Students. Thirty-Second Annual Meeting of the Society for the Scientific Study of Reading, Calgary, AB, Canada

Verno-Lavigne, E., Cui, M. E., Saxena, S., Fink, L. & Hermann, B. (2025, February). Eye Movement Decreases During Challenging Listening Conditions: Evidence from Mobile Eye-Tracking Glasses. LOVE Conference 2025, Niagara Falls, ON, Canada.

Wood, E., Miguel, M. & Trainor, L. J. (2025, July). The Influence of Audience Presence on Expressive Performance in a Professional Pianist. The International Conference on Music Perception and Cognition, São Paulo, Brazil.

Xing, S., Fink, L., Bosnyak, D. & Cameron, D. (2025, November). How Does Low Bass Make Us Move? Investigating the Sensory and Physiological Mechanisms of Very Low Frequencies' Effect on Movement and Pleasure. The 21st Annual Neuromusic Conference, Hamilton, ON, Canada.

OPERATIONS TEAM

In 2020, ARiEAL established a trainee-based operations team known as the ARiEAL Operational Team (AOT). Working collaboratively with ARiEAL Manager **Dr. Maxime Dagenais**, the AOT supports our centre's knowledge mobilization and learning activities, social media engagement, and event planning. The AOT operates on a one-year renewable term and provides hands-on opportunities for undergraduate and graduate trainees to participate in and lead various training and knowledge mobilization activities. With the leadership and creativity demonstrated by our AOT Team, ARiEAL expanded its reach through our social media platforms, organized valuable networking, professionalization, and mental health events and organized some much-needed, light-hearted breaks from our research and work, including our **Third Annual ARiEAL Cup Games Night** that was won by Team Syntax Lab-Grammatical Theory Group.

Along with the AOT Team, ARiEAL also benefited from a team of MacPherson Student Partners who helped develop and guide various projects to fruition. Thanks to the hard work of **Braulio Lopes**, **Simran Sandal**, and **Alexandra Jackson**, the third volume of our *ARiEAL Research Magazine* was published and showcased our trainees' research. With Volume 3, our team expanded *ARiEAL Research Magazine* into an international peer-reviewed journal. The issue features eight contributions: three full-length articles, four academic posters, and one short-form literature review. Featured articles include an undergraduate trainee's investigation of habitual aspect in Trinidadian English; an undergraduate student from Lagos State University of Education discussing language acquisition in multilingual environments and the implications of current findings for education; a PhD student in the Cognitive Science of Language program exploring the interaction between word transparency and lexical quality; and another PhD student in the program analyzing Persian plural allomorphy within the framework of Distributed Morphology. The four posters published in this issue showcase an undergraduate trainee's study of how dialect background and speaker type (native vs. heritage) influence the production of geminates in Arabic; a master's student in the Cognitive Science of Language program examining the effects of first language and citizenship status on the income of Canadian university graduates; a graduate trainee's investigation of the enclitic particle =*lu* in Inuktitut; and a collaborative project between an undergraduate and a master's graduate assessing short-term memory capacity for non-verbal rhythm through experimental tasks.



DR. MAXIME DAGENAIS



BRIANNA GRISKA-MACPHEE



ASYA KAHZAM



AMELIA COCCHIO



NAVALAN PRABAHARAN

THE CENTRE

Founded in late 2016, ARIEAL celebrated its ninth full calendar year since its inception. We are proud of the mentorship demonstrated by our researchers and our amazing trainees of all levels and the incredible and important research that they are creating.

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Brianna Griska-Macphee
(January-December 2025)

Audrey Ho
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***Completed Program in 2025**

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University of Waterloo

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