



ARiEAL

Centre for Advanced Research in
Experimental and Applied Linguistics

ANNUAL REPORT
2021



MESSAGE FROM THE DIRECTOR

This is the first time I am composing the formal message for the ARiEAL annual report as the Centre's new Director (as of July 2021), with the work reported here falling largely under the legacy of ARiEAL's Founding Director, Dr. John Connolly. As I write, it is mid-April of 2022. Our community, affected by two years of COVID has faced additional challenges stemming from recent world events, primarily the new refugee exodus from Afghanistan and the war in Ukraine, the first major war in Europe since Yugoslavia. Despite their tragic dimension, these challenges have highlighted the resilient spirit of our community, and our ability to thrive and offer our help to others. As part of our response to these events, ARiEAL welcomed our first displaced Ukrainian doctoral student, brought onboard as a visiting student through a new ARiEAL initiative for International Visiting Scholars. This initiative was originally planned as a pilot program for summer 2022 and it was quickly adapted this spring to spur our efforts to support scholars from war zones. It has been a tremendous experience to have the privilege to work with and learn from the ARiEAL community over the last ten months in my new position. World events have even provided unprecedented research opportunities. As an example, Dr. Victor Kuperman's Reading Lab has made important discoveries on effects of loneliness in the elderly in their Niagara Stories project, which has evolved and adapted to the very particular pandemic circumstances.

Despite the ongoing global challenges, for ARiEAL, the year 2021 was a year of research excellence, demonstrating our continuous efforts to produce world-class cognitive science of language research in an interdisciplinary setting. As our new mission and vision statements highlight, the strength and uniqueness of the Centre lies in its full life cycle of research, with mutually complementary fundamental and applied research.

In 2021, the Centre also underwent a 5-year external review. The review was a rigorous review process involving documentations of Centre goal and achievements, as well as stakeholder interviews. The external reviewers' report commended ARiEAL on the quality of our research, the training provided by ARiEAL, and our connections to community-based research. The report also highlighted the fundamental role of ARiEAL trainees, both in advancing our research and in creating a more equitable and inclusive community.

As ARiEAL continues to evolve, considerations of equity, diversity, and inclusion drive our efforts. In addition to the new International Scholar Program, which is projected to welcome and support scholars from countries with emerging economies or war zones, the Centre will soon form a new Scientific Advisory Committee, the composition of which will be guided by a new set of recommendations made by the Centre's committee on equity, diversity, and inclusion. Our ongoing work to engage local communities, including local Indigenous communities, in our research and research training is an integral part of the process.

Before concluding I would like to express my gratitude to the Centre's manager, Chia-Yu Lin, who has been an incredible force behind much that has taken place in the Centre. I also would like to recognize the work of the ARiEAL's Operation Team: trainee volunteers, working under Chia-Yu Lin's supervision, who have relentlessly worked on creating additional learning opportunities and social events for trainees and other community members. My final thank-you goes to Dr. John Connolly who, as the Founding Director, made ARiEAL into the research space and community it is in 2022. Thank you, John!



Director, ARiEAL Research Centre
Associate Professor, Department of Linguistics and Languages

RESEARCH HIGHLIGHTS

ARiEAL has a group of committed researchers, trainees, and staff who work diligently to create an enriched environment leading research in the field of language science. Highlighted below are the 2021 research activities from each of the laboratories led by ARiEAL researchers.

Syntax Lab

DIRECTOR: DR. IVONA KUČEROVÁ



Director of the Syntax Lab, Dr. Ivona Kučerová (Photo Credit: Georgia Kirkos)

Dr. Ivona Kučerová, director of the Syntax Lab, investigates syntactic structures, with a specific focus on the syntax-semantics interface. More specifically, the lab is investigating if, 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 modelling features at the syntax-semantics interface.

In 2021, Alish Kocz completed his master's degree and Kurtis Commanda received Mitacs funding to pursue an internship with the Kahawi Theatre. Dr. Kučerová and her trainees presented on underspecification of nominal functional categories in Slavic and Semitic at the Olomouc Generative Syntax Colloquium, and the research evidence on the remnant licensing and structural economy in VP ellipsis was presented at the Annual Meeting of Formal Approaches to Slavic Linguistics. Dr. Kučerová also delivered a keynote talk on neuter gender in Slavic at the 17th Annual Meeting of the Slavic Linguistics Society.

MELD Programs and The MELD Bilingualism Lab

DIRECTOR: DR. ANNA MORO



Associate Director of the ARIEL Research Centre and Director of MELD programs and the Bilingualism Lab, Dr. Anna Moro (centre). Photographed together with Rita Jiang, Communications Associate of MELD Programs (left) and Yasmin Mohamed, Instructional Assistant of MELD Programs (right). (Photo Credit: Angela Herring-Lauzon)

The McMaster English Language Development (MELD) Programs and the MELD Bilingualism Lab are directed by Dr. Anna Moro. 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 McMaster English Readiness for Graduate Excellence (MERGE) and 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 curriculum, and were offered virtually during the pandemic.

The MELD Bilingualism Lab investigates the underlying linguistic mechanisms of bilingual phenomena and focuses on second language

development. Together with postdoctoral researcher Dr. Daniel Schmidtke, results from a longitudinal eye movement study on the determinants of word-reading development in MELD cohorts were published in Reading Research Quarterly. Dr. Anna Moro, Dr. Daniel Schmidtke, and Sadaf Rahmanian also presented this longitudinal eye movement study at the Words in the World International Conference 2021.

Teaching and Learning Lab

DIRECTOR: DR. CATHERINE ANDERSON



Dr. Anderson, Director of the Teaching and Learning Lab (Photo Credit: Lindsay Palmer)

Dr. Catherine Anderson, an Associate Professor in the Department of Linguistics and Languages, directs the Teaching and Learning Lab. The lab collaborates with undergraduate student partners and focuses on students' experiences in a variety of undergraduate learning contexts. Dr. Anderson founded [TILCoP Canada](#), the Teaching in Linguistics Community of Practice: a collective of faculty members from across Canada who meet regularly to share practices and resources since 2020. The group also created and produced [Word to the Whys](#), a companion podcast for Intro Linguistics courses. Dr. Anderson also received funding from eCampusOntario to develop the second edition of the open-source textbook, *Essentials of Linguistics*.

Neurotechnology and Neuroplasticity Lab

DIRECTOR: DR. SUE BECKER



Director of the Neurotechnology & Neuroplasticity Lab, Dr. Sue Becker (Photo provided by Dr. Sue Becker)

Dr. Sue Becker is the director of the Neurotechnology & Neuroplasticity Lab, which uses computational modeling and empirical studies to investigate the neural bases of learning and memory and how it serves in episodic future thinking, planning and decision-making. Dr. Becker's lab addresses 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 2021, Saurabh Shaw and Leila Mousapour completed their doctoral and master's degree, respectively. Mohammad Chaposhloo, a doctoral student, was awarded a MacData Fellowship in 2021. Additionally, trainees of Dr. Becker and Dr. Sonnadara worked on a project focusing on Ontario's digital research

infrastructures needs assessment and capacity building with funding support from Mitacs. In 2021, Dr. Becker wrote a book chapter on memory of space in the *Oxford Handbook of Human Memory*, and other publications in *Consciousness and Cognition* and *Brain and Cognition*.

LANGUAGE, MEMORY AND BRAIN LAB – EEG

CO-DIRECTOR: DR. JOHN CONNOLLY



Co-director of the Language, Memory and Brain Lab, Dr. John Connolly
(Photo Credit: Ron Scheffler)

The Language, Memory and Brain (LMB) Lab is co-directed by Drs. John Connolly and Elisabet Service. Dr. Connolly's research focuses on using brain recordings (EEG) to investigate a range of neurocognitive phenomena including attention, memory, and language processing and the changes seen in brain injury and during recovery in conditions from concussion to coma. Dr. Connolly officially retired in 2021 and stepped down from the directorship of

ARiEAL. He has since assumed the rank of Professor Emeritus at McMaster University and continued with an active research profile since his retirement.

In 2021, Kiersten Mangold completed her master's degree and Dr. Paniz Tavakoli completed her postdoctoral fellowship at McMaster. Together with their trainees, Dr. Connolly collaborated with Dr. Noseworthy, and published their findings on the localization and identification of brain microstructural abnormalities in paediatric concussion in *Frontiers in Neuroscience*. Dr. Connolly was also an invited speaker at the University of Ghana where he discussed the electrophysiological assessment of neurocognitive function in health and pathology, and presented literature from acquired brain injury to post COVID syndrome. Dr. Connolly and the team continued their research work on determining the prognosis of comatose patients, and received additional funding with Dr. Paniz Tavakoli from the McMaster Arts Research Board to expand the coma study.

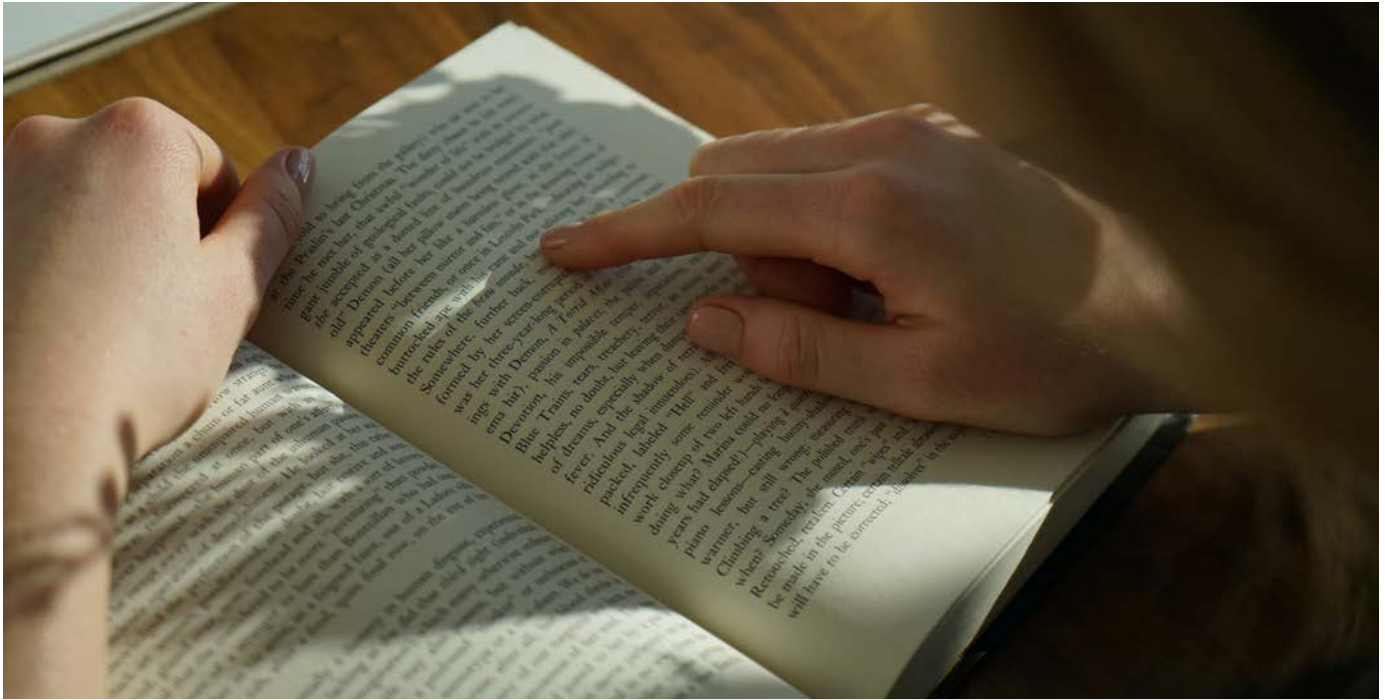


Photo by Thought Catalog on Unsplash

Language, Reading and Cognitive Neuroscience Lab

DIRECTOR: DR. MARC JOANISSE



Director of the Language, Reading and Cognitive Neuroscience Lab, Dr. Marc Joanisse (Photo provided by Dr. Marc Joanisse)

Dr. Marc Joanisse directs the Language, Reading and Cognitive Neuroscience Lab which is housed in The University of Western Ontario's Brain and Mind Institute.

Dr. Joanisse's research focuses on the cognitive and neural foundations of language and reading across the lifespan. This includes studying reading and language disorders in children, as well as language learning and processing in adults.

2021 was another fruitful year in peer-reviewed publications for Dr. Joanisse, his collaborators, and his trainees. Research results on resting-state functional connectivity and reading subskills in children and the reciprocal relations between reading skill and phonological awareness in children were disseminated in highly regarded journals, such as *NeuroImage*. Dr. Joanisse continues to work on advancing full literacy in a digital world as a part of his 7-year Social Sciences and Humanities Research Council (SSHRC) Partnership Grant.

The Reading Lab

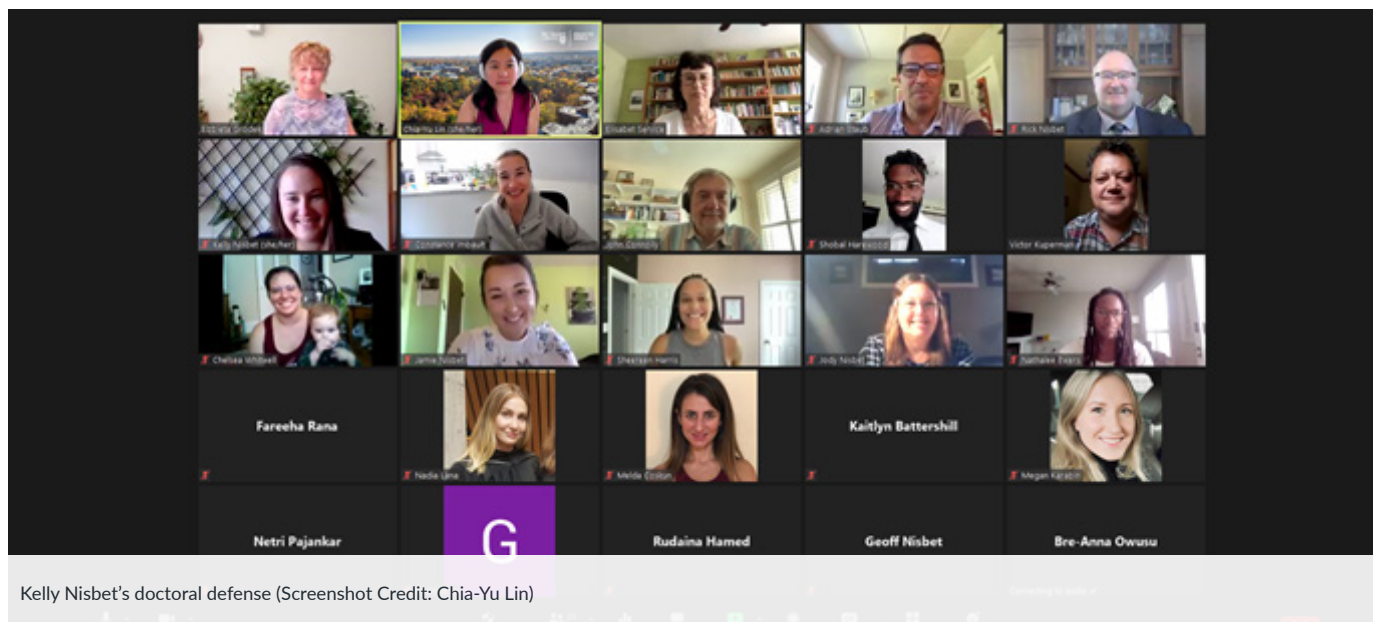
DIRECTOR: DR. VICTOR KUPERMAN



Director of the Reading Lab, Dr. Victor Kuperman (Photo Credit: JD Howell)

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 2021, Kelly Nisbet completed her doctoral degree, and Nadia Lana completed her master's degree and continued to doctoral training at the Reading Lab. Dr. Kuperman received an Insight Grant from the Social Sciences and Humanities Research Council (SSHRC) to investigate the impact of COVID-19 on reading comprehension in Canadian and US university students. Dr. Kuperman and his collaborators and trainees generated many impactful publications in journals such as *Journal of Experimental Psychology: General* and *Behavior Research Methods*. Dr. Kuperman was invited to present the evidence on their new eye tracking corpora internationally in 2021. To further the research on the linguistic markers of social isolation, the Reading Lab initiated an intergenerational writing program "Writing Across Generations" for older adults and high school students at YMCA Spokane, WA, USA. A similar program will be launched in the Niagara region in 2022.



Imaging Research Centre

DIRECTOR: DR. MICHAEL NOSEWORTHY



Director of the Imaging Research Centre, Dr. Michael Noseworthy

tissue microstructure and metabolism using multimodal medical imaging, such as the magnetic resonance imaging (MRI) and in vivo nuclear magnetic resonance (NMR) spectroscopy. His work considerably involves developing imaging hardware and software, and the research team works to study physiological problems and diseases using advanced medical imaging techniques.

Dr. Noseworthy and team published extensively in 2021, and their work appeared in the high impact journals, such as *Journal of Science and Medicine in Sport* and *European Journal of Sport Science*.

Dr. Michael Noseworthy is the director of Medical Imaging Physics and Engineering at the Imaging Research Centre at St. Joseph's Healthcare, Hamilton. Dr. Noseworthy's research interests focus on assessment of



A MRI experiment demonstration by Dr. Michael Noseworthy (Image provided by Dr. Michael Noseworthy)

The Phonetics Lab

DIRECTOR: DR. DANIEL PAPE



Director of the Phonetics Lab, Dr. Daniel Pape (Photo Credit: Colin Czerneda)

Dr. Daniel Pape is the director of the Phonetics Lab. His research examines experimental phonetics and speech acoustics, the link between speech production and speech perception, and the relationship between phonetics and neurolinguistics. Two new research streams were recently introduced at the Phonetics Lab. The first stream focuses on how different academic content, foreign accents and gender influence the accuracy of caption errors in academic online lectures and video conferences, a topic that was a focus of interest during the global pandemic. The second stream examines production and perception differences of bilingual speakers with different degrees of proficiency in their two languages, more specifically Canadian English/French speakers.

In 2021, Carla Weigel from the Phonetics Lab finished her master's degree. Dr. Pape was a speaker at the 4th Phonetics and Phonology Conference in Europe (PaPE) where he presented his research on the perceptual cue weighting of intervocalic velar plosives in Canadian English. Together with

his trainees, their work on applying automatic speech to text in academic settings for the deaf and hard of hearing was presented at the Current Research in Engineering, Science & Technology (CREST) Meeting in Hamilton, Ontario and at the LACUS conference in Toledo, Ohio. Dr. Pape also presented his collaborative work on Polish sibilant variability at the 50th Poznań Linguistic Meeting (PLM) in Poznań, Poland.

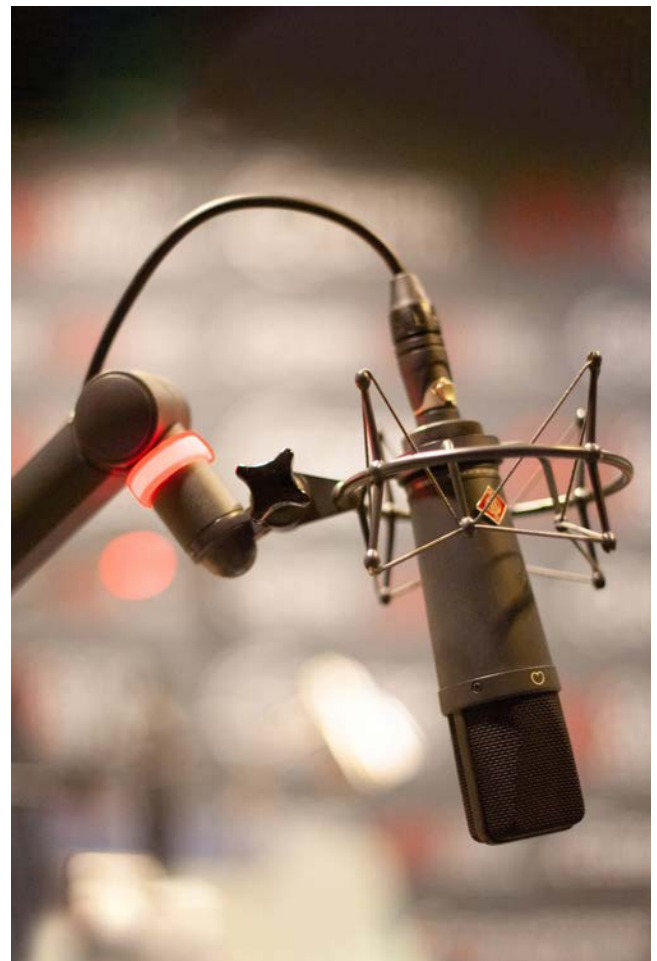


Image by Andrzej Rembowski from Pixabay

The Reilly Lab

DIRECTOR: DR. JIM REILLY



Director of the Reilly Lab, Dr. Jim Reilly (Photo provided by Dr. Jim Reilly)

Dr. Jim Reilly is an internationally renowned researcher in the field of signal processing. His work focuses on the application of machine learning and signal processing in relation to health-related problems, such as neuroscience. Dr. Reilly specializes in the development of machine learning algorithms, and the effort has been applied to improving diagnosis and treatment of psychiatric illness, prognosis for coma outcome, and assessment of infant motor movement relating to neurological deficit.

In the year of 2021, Dr. Reilly and collaborators published their work on the advanced signal processing methods for characterization of schizophrenia in *IEEE Transactions on Biomedical Engineering* and their machine learning approach in identifying self-harm and suicidal ideation among military and police Veterans in the *Journal of Military, Veteran and Family Health*. Dr. Reilly and his collaborators were also awarded a New Frontiers in Research Funding to study the use of artificial intelligence to predict suicide attempts among youth, using his expertise in machine learning.

Language, Memory and Brain Lab –Behavioural

CO-DIRECTOR: DR. ELISABET SERVICE



Co-director of the Language, Memory and Brain Lab, Dr. Elisabet Service (Photo Credit: Colin Czerneda)

The Language, Memory and Brain (LMB) Lab is co-directed by Drs. John Connolly and Elisabet Service. Dr. Service investigates the cognitive building blocks in language development and its relationship with working memory, alongside basic research on language acquisition, spoken word processing, and other related cognitive processes. Much of this work is then applied in investigations of language disorders including dyslexia.

In 2021, the results of Dr. Service's collaborative project with the University of Helsinki on developmental language disorder were published in *International Journal of Language Communication Disorders* and *Frontiers in Psychology, Language Sciences* section. The findings suggests that language disorder is associated with atypical development of short-term memory for temporal event order in both unilingual and bilingual children. Furthermore, order memory in atypical, but not in typical, language development is related to language abilities. This highlights nonverbal constraints

on language development. Dr. Service also received funding from Social Sciences and Humanities Research Council (SSHRC) to investigate the effects of working in a second language on strategic thinking. Research by PhD candidate Fareeha Rana as well as former lab students Angie Lopez Ricote, Erin DeBorba and Meliha Horzum was presented at the annual conference of the Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS). The former lab students' work as well as that of PhD candidate Bre-Anna Owusu was also presented at the conference of the Psychonomic Society.

The Turkstra Lab

DIRECTOR: DR. LYN TURKSTRA



Director of the Turkstra Lab, Dr. Lyn Turkstra (Photo provided by Dr. Lyn Turkstra)

Dr. Lyn Turkstra heads 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.

In 2021, the lab's main activities related to an ongoing National Institutes of Health (NIH) funded project that aims to develop technologies to support people with TBI in using social media. As part of this project, PhD student Lisa Kakonge, and University of Wisconsin-Madison postdoctoral fellow Hajin Lim completed virtual focus groups with individuals with TBI in the US and Canada to learn about their social media experiences. Undergraduate student, Catherine Bosyj, completed a scoping review of literature on cognitive factors in computer use, results of which will be applied to the tech development; and former master's student Reihaneh Ahmadi completed analysis of her "think aloud" thesis, which aimed to learn how and why people with TBI used social media. The lab had other exciting student-initiated projects, including a study of sex- and gender-based differences in cognition by Sukhman Baath, and Imad Ali's study showing how emojis influence interpretation of text messages. In 2021, Dr. Turkstra and colleagues published extensively in well-respected journals, such as *Brain*, *American Journal of Speech Language Pathology*, and *International Journal of Language Communication Disorders*.

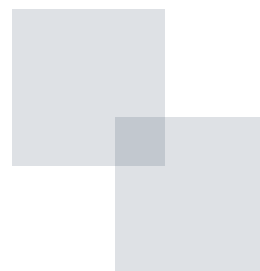




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The Language and Working Memory Lab

DIRECTOR: DR. LISA ARCHIBALD



Director of the Language and Working Memory Lab, Dr. Lisa Archibald
(Photo provided by Dr. Lisa Archibald)

The Language and Working Memory Lab, directed by Dr. Lisa Archibald, is part of the School of Communication Sciences and Disorders at The University of Western Ontario. The Language and Working Memory

Lab focuses on investigating how language and memory processes interact in both children learning at a typical rate and those with learning disabilities.

The year of 2021 marked the completion of their doctoral training for Alexandra Cross and Theresa Pham. Dr. Theresa Pham has since started her postdoctoral fellowship at the Language and Working Memory Lab. Dr. Archibald and colleagues published extensively in 2021 in highly regarded journals, such as *Journal of Speech, Language, and Hearing Research*, and *Memory and Cognition*. In the 2020-2021 school year, the Language and Working Memory Lab partnered with the University of Western Ontario's Child and Youth Development Clinic and the Learning Disabilities Association – London Region to compare two community-based reading instruction programs: Leap to Literacy vs. Wise Words. Dr. Archibald has also received funding from the Natural Sciences and Engineering Research Council of Canada (NSERC) to support her project on determining the cognitive, linguistic, and input features influencing oral language processing.

The mTBI Research Program

DIRECTOR: PROF. CAROL DEMATTEO



Director of The mTBI Research Program, Professor Carol DeMatteo (Photo Credit: Georgia Kirkos)

As a clinician scientist, Professor Carol DeMatteo specializes in childhood neurotrauma, specifically acquired brain injury including concussion. Professor DeMatteo officially retired in 2021 and has since assumed the rank of Professor Emeritus at McMaster University. Yet, she continues with her concussion research at CanChild Centre for Childhood Disability Research.

In 2021, Prof. DeMatteo and the team published their research on pediatric concussion in prestigious journals such as *Journal of Concussion*, *Frontiers in Human Neuroscience*, and *BMJ Open Sport and Exercise*. The result on correlating concussion-related symptoms to the personalized MRI assessment of brain abnormalities in children, which was a collaboration among Prof. DeMatteo, Drs. Connolly and Noseworthy and their trainees, was presented at the International Society of Magnetic Resonance in Medicine Annual Meeting in 2021.

The Performance Science Lab

DIRECTOR: DR. RANIL SONNADARA



Director of the Performance Science Lab, Dr. Ranil Sonnadara (Photo provided by Dr. Ranil Sonnadara)

The Performance Science Lab, directed by Dr. Ranil Sonnadara, aims to understand the science and art behind human performance. More specifically, the lab investigates how individuals learn complex skills, how information flow across the motor and perceptual systems changes 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 of health professionals, musicians, and athletes.

In 2021, Kestrel McNeill completed her master's degree and continues in the lab as a doctoral student. She received Mitacs funding to investigate Ontario's digital research infrastructures needs assessment and capacity building alongside Dr. Sonnadara and Dr. Becker. In 2021 Dr. Sonnadara also received a McMaster Surgical Associated Education Research Grants to develop learning tools for medical students, and to study burn out in trainee and practicing surgeons. Dr. Sonnadara and the team published their research in esteemed journals such as the *British Medical Journal*, the *Journal of Surgical Education* and *Medical Education*.

BY THE NUMBERS

Despite the ongoing challenges imposed by the global pandemic, ARiEAL researchers and their trainees continue to demonstrate their research expertise through peer-reviewed publications and presentations, while maintaining a track record of successful research funding of all levels throughout 2021.

Publications

ARiEAL researchers published 53 articles and 1 book chapter in 2021. Broadly, the research topics included language acquisition, word reading, working memory and the use of neuroimaging and machine learning in brain injury and other clinical fields.

ARTICLES

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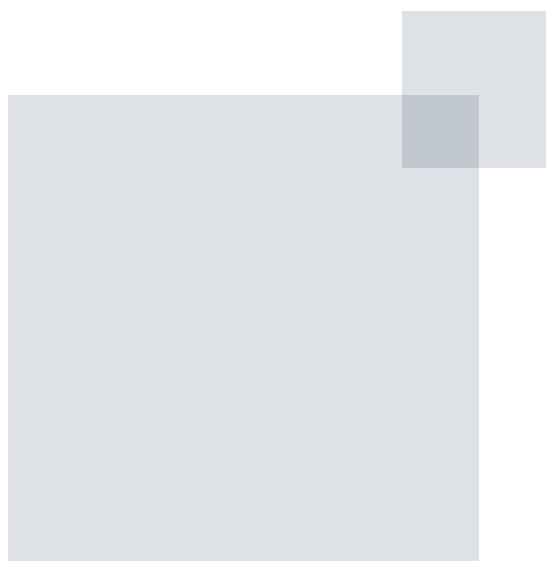
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Presentations

Despite the various cancellation and postponement of scientific conferences worldwide, ARiEAL researchers presented 19 peer-reviewed conference presentations and 4 invited talks virtually in 2021.

Archibald, L. (2021, March & April). Criteria and crucial conversations about DLD (A two part series). Speech-Language and Audiology Canada. Ottawa, Canada. (Invited; Delivered Online)

Connolly, J. (2021, March). Electrophysiological assessment of neurocognitive function in health and pathology: From Acquired Brain Injury to Post COVID Syndrome. Invited Lecturer at Centre for Ageing Studies, College of Humanities, University of Ghana. Accra, Ghana. (Invited; Delivered Online)

Danielli, E., Stillo, D., Ho, R., **DeMatteo, C.**, Hall, G.B., Bock, N., **Connolly, J.**, & **Noseworthy, M.** (2021, May). Correlating concussion-related symptoms to the personalized MRI assessment of brain abnormalities in children. 2021 International Society of Magnetic Resonance in Medicine Annual Meeting. Vancouver, Canada. (Delivered Online)

Ewers N., Hunt C.L., Mangold K., & **Connolly J.** (2021, June). Worth taking the hit? Understanding the effects of concussion and subconcussive impacts on cognitive health. Annual Canadian Psychological Association. Canada. (Delivered Online)

Herrera-Diaz, A., Kolesar, R., Boshra, R., **Reilly, J.**, Tavakoli, P., Pajankar, N., Lin, C., Bagheri, E., Morrison, H., & **Connolly, J.** (2021, July). Multivariate Decoding of Auditory Event-Related Potentials to Track Coma Progression. Virtual World Congress on Brain Injury. Alexandria, USA. (Delivered Online)

Kučerová, I. (2021, September). Neuter is a lonely gender. Slavic Linguistics Society (SLS) 16. Champaign, IL, USA. (Invited; Delivered Online)

Kučerová, I. & Szczegielniak, A. (2021, June). Underspecification of nominal functional categories in Slavic and Semitic. Olomouc Generative Syntax Colloquium. Olomouc, Czech Republic. (Delivered Online)

Kučerová, I. & Szczegielniak, A. (2021, May). Remnant licensing and structural economy in VP ellipsis: Evidence from Czech. Annual Meeting of Formal Approaches to Slavic Linguistics. Cambridge, USA. (Delivered Online)

Kuperman, V. (2021, June). How to study reading comprehension and fluency in the first and second language using eye-tracking data. 8th Summer NeuroLinguistics School. Moscow, Russia. (Invited; Delivered Online)

Kuperman, V. (2021, May). What makes us proficient readers in a second language: new eye-tracking corpora. Invited Talk at the Department of Linguistics at Montclair State University. Montclair, USA. (Invited; Delivered Online)

Kuperman, V. (2021, March). Reading proficiency in second language: new evidence from eye-tracking corpora. Invited Talk at the University of Belgrade. Belgrade, Serbia. (Invited; Delivered Online)

Lorenc, A., Żygis, M., **Pape, D.**, & Mik, L. (2021, September). Articulatory and acoustic variation in the realization of Polish retroflexes. 50th Poznań Linguistic Meeting (PLM). Poznań, Poland. (Delivered Online)

Lorenc, A., Żygis, M., **Pape, D.**, & Mik, L. (2021, September). Articulatory characteristics of Polish retroflex sibilants. Conference of the Commission for Phonetics and Phonology of Slavic Languages of the International Slavic Committee. Zagreb, Croatia. (Delivered Online)



Mann, R., Acai, A., & **Sonnadara, R.** (2021, March). Data source prioritization among novice raters in competence committee decision making. 3rd Annual Ontario Student Medical Education Research Conference. Toronto, Canada. (Delivered Online)

Mousapour, L., Dabagh, Y., Dhindsa, K., **Reilly, J.**, **Connolly, J.**, & **Becker, S.** (2021, February). EEG source space analysis for brain-computer interfaces. Vector Institute Research Symposium. Toronto, Canada. (Poster; Invited; Delivered Online)

Owusu, B. & **Service, E.** Can musical rhythm primes boost memory for new word forms in dyslexia? 62nd Annual Meeting of the Psychonomic Society, New Orleans, USA, November 4th–7th, 2021. (Poster; Delivered Online)

Pape, D., & Mercier, O. (2021, June). Perceptual cue weighting of intervocalic velar plosives in Canadian English. 4th Phonetics and Phonology Conference in Europe (PaPE). Barcelona, Spain. (Delivered Online)

Rana, F. & **Service, E.** (2021, June). The building blocks of temporal variation in language processing. Canadian Society for Brain, Behaviour and Cognitive Science. Montreal, Canada. (Delivered Online)

Reilly, J. (2021, June). Analysis of ERP data Using Principal Components in Time and Space. Presentation at the Coma Research Group. Hamilton, Canada. (Invited; Delivered Online)

Schmidtke, D., Rahmian, S., & **Moro, A.** (2021, November). Reading experience drives L2 reading development: a longitudinal study of EAL reading habits. Words in the World International Conference 2021. St. Catharines, Canada. (Delivered Online)

Service, E., DeBorja, E., Lopez Ricote, A., & Horzum, M. (2021, November). Short-Term Memory for Patterns in Time and for Nonsense Sentences Predicts Learning of Foreign Words. 62nd Annual Meeting of the Psychonomic Society. New Orleans, USA. (Delivered Online)

Service, E., DeBorja, E., Lopez Ricote, A., & Horzum, M. (2021, June). Individual differences in foreign word form learning: Roles for rhythm and STM for non-sentences. Canadian Society for Brain, Behaviour and Cognitive Science. Montreal, Canada. (Delivered Online)

Weigel, C., **Pape, D.**, & Stroińska, M. (2021, July). Applying Automatic Speech to Text in Academic Settings for the Deaf and Hard of Hearing. LACUS Virtual Conference. Toledo, USA. (Delivered Online)

Weigel, C., **Pape, D.**, & Stroińska, M. (2021, March). Applying Automatic Speech to Text in Academic Settings for the Deaf and Hard of Hearing. Current Research in Engineering, Science & Technology (CREST) Meeting. Hamilton, Canada. (Delivered Online)

Grants

ARiEAL researchers received funding for 10 new research projects as Principal Investigators or Co-investigators in 2021. The total funding reached almost \$700,000 dollars across these newly commenced projects.

Funding sources include the Social Sciences and Humanities Research Council (SSHRC), the Natural Sciences and Engineering Research Council of Canada (NSERC), and Mitacs, as well as various other funding agencies.

Anderson C., Bjorkman, B., Doner, J., Grant, M., Mills, T., Sanders, N., & Taniguchi, A. Essentials of Linguistics 2nd edition. eCampusOntario, \$25,500, 2021-2022.

Archibald, L. Determining the cognitive, linguistic, and input features influencing oral language processing. The Natural Sciences and Engineering Research Council of Canada, \$140,000, 2021.

Blundon, E., Krueger-Naug, A.M. & **Connolly, J.** Describing aspects of brain function at end of life. Dalhousie University, \$60,000, 2021.

Commanda, K. & **Kučerová, I.** Internship Award with Kahawi Theatre. Mitacs, \$15,000, 2021.

Kapczinski, F., **Reilly, J.**, et al. The use of artificial intelligence to predict suicide attempts among youth: a machine learning approach. Social Sciences and Humanities Research Council, \$247,088, 2021-2023.

Kuperman, V. Understanding the impact of COVID-19 on reading comprehension in Canadian and US university students: a multi-componential approach. Social Sciences and Humanities Research Council, \$38,835, 2021-2026.

McNeill, K., **Becker, S.**, & **Sonnadara, R.** Ontario's digital research infrastructures needs assessment and capacity building. Mitacs, \$15,000, 2021-2022.

Peterson, D. & **Sonnadara R.** A Self-Directed Learning Tool for Orthopedics in Undergraduate Medical Education. McMaster University, \$29,818.51, 2021.

Service, E. & Connolly, C. The effects of working in a second language on strategic thinking. Social Sciences and Humanities Research Council, \$150,668, 2021-2025.

Tavakoli, P. & **Connolly, J.** Using electrophysiology to differentiate between disorders of consciousness. McMaster Arts Research Board, \$6,820, 2021.



IMPACT

ARiEAL strives to expand its research reach to engage the broader scientific community and beyond. In 2021, we continued with our youth outreach initiative and hosted our first 3-week session on scientific journals and the peer-reviewed process for children and youth. All talks and events were held virtually in 2021 to ensure safety. Many of these are archived on our website to ensure easy access and greater knowledge dissemination.

Engagement

Towards our goal as a resource hub, the ARiEAL website continues to attract curiosity from people around the world as shown by almost 10,000 visitors from 101 countries in 2021 alone. This map highlights the top 20 countries from which our website visitors come. During 2021 our official Twitter handle reached over 110,000 impressions, with 126 tweets and retweets, and exceeded 3,500 engagement counts. Our Instagram account, now with 349 followers, has continued to

foster engagement, specifically with high school and undergraduate students. One of the key initiatives on ARiEAL Instagram is the Spotlight series where our researchers, students and staff were being featured to share their research and fun facts about themselves! The year 2021 has continued to inform us the importance of knowledge mobilization and engagement through virtual platforms, and we will maintain this endeavour into the future.

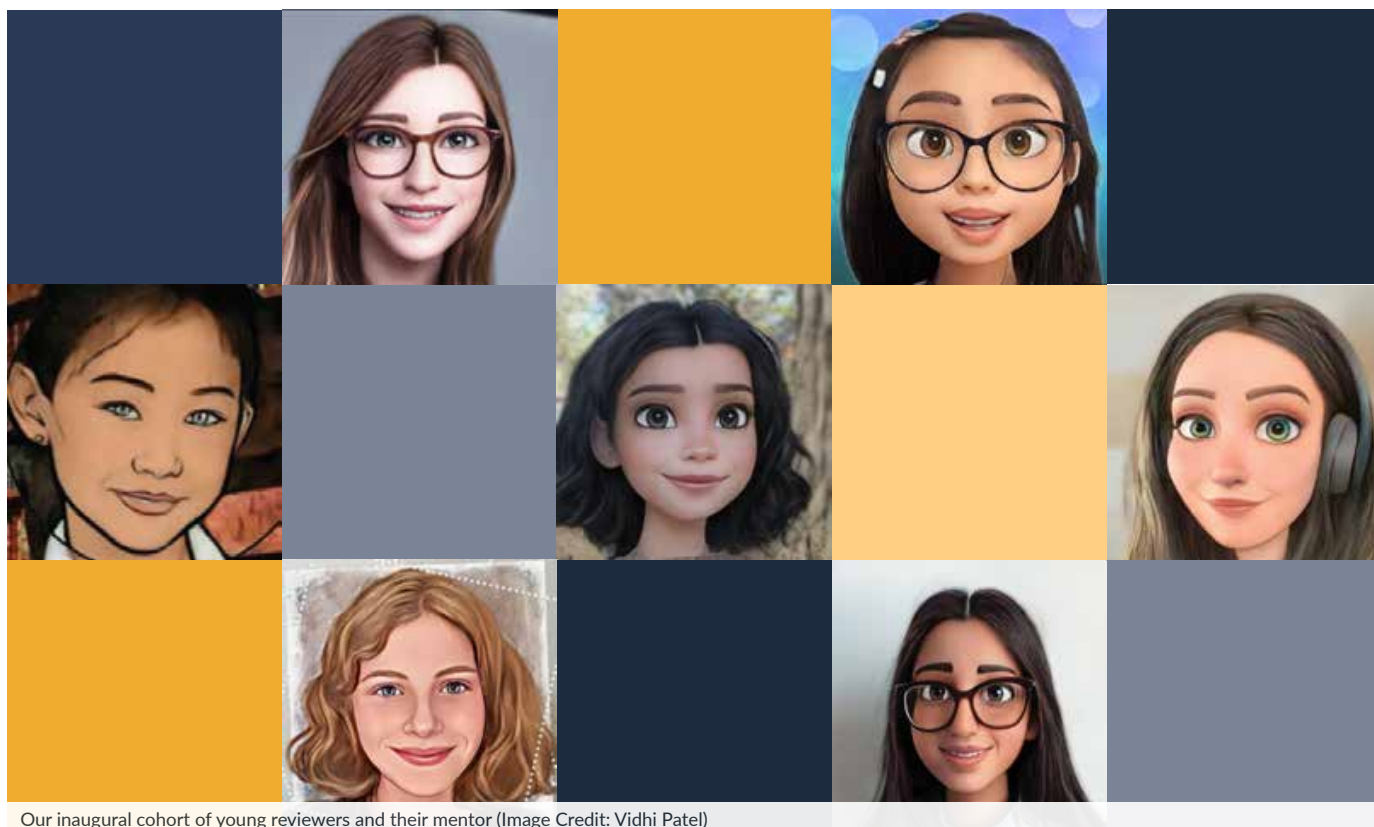


Youth Outreach

ARiEAL aims to engage children and youth in the culture of scientific research and higher education through meaningful activities. In 2021, we developed a repertoire of resource based on the model of the Frontiers for Young Minds, an open access scientific journal both reviewed by and designed for children and youth between 8-15 years of age. Our goal was to raise the awareness on scientific literacy by introducing the scientific journals and the peer-review process to the next generation. The project was funded by the MacPherson Institute Student Partner Program and carried out collaboratively by ARiEAL manager, Chia-Yu Lin, a MacPherson student partner, Vidhi Patel, and a team of ARiEAL trainees, Dr. Paniz Tavakoli, Deewa Anwarzi, Nadia Lana, Netri Pajankar, and Caryn Qian. After two rounds of pilot test with children and youth from the local community, the team successfully hosted an inaugural

3-week session where ARiEAL alumna, Dr. Constance Imbault, led 9 children through the journey of understanding the scientific journals and peer-review process. Together, they then reviewed a scientific manuscript and offered insightful feedback to the authors. This manuscript is expected to be published in the Frontiers for Young Minds in 2022.

ARiEAL trainees, Emilie Altman (Reading Lab), Sukhman Baath (Turkstra Lab), Audrey Ho (Syntax Lab), Monika Krizic (Phonetics Lab), Bre-Anna Owusu (Language, Memory and Brain Lab - Behavioural), Netri Pajankar (Language, Memory and Brain Lab – EEG), Sara Pearsell (Phonetics Lab), and Caryn Qian (Language, Memory and Brain Lab – EEG), worked collaboratively and delivered engaging virtual sessions at the GenSTEM Conference for high school students organized by McMaster's Women in Science and Engineering (WISE) initiative in December 2021.



Our inaugural cohort of young reviewers and their mentor (Image Credit: Vidhi Patel)

Events

The ARiEAL Speaker Series established in late 2019 continues to host renowned researchers, including ARiEAL's very own Scientific Advisory Committee members, Drs. Denise Klein, Sid Segalowitz, and Penny Pexman, to share their wealth of knowledge. ARiEAL also offers various opportunities for trainees of all levels to develop and refine their research skills through the ARiEAL Learning Series on topics such as how to captivate online audiences. Recorded Speaker & Learning Series events are made available on the ARiEAL Archive.

ARiEAL Learning Series

Life After ARiEAL: Career Planning

Wednesday, December 8, 2021
5:00 - 7:00 pm | Zoom (RSVP required)

Graduating can be an overwhelming process. It is common to feel unsure about what your future looks like. If you are still exploring what you want to do next, this event is perfect for you!

We will be joined by 3 ARiEAL alumni working in various fields for a panel-discussion event, where we will hear about their experience leading to their current position in academia, research, and industry. Event attendees will also have opportunities to ask questions to learn more about the panelists' career paths.

Our panelists include: Dr. Rober Boshra (Postdoctoral Associate, Princeton University), Tess Hudson (Research Coordinator, Musculoskeletal Oncology Unit, McMaster University), and Sadaf Rahmanian (Associate Technical Writer, Vena Solutions).

RSVP at:
<https://bit.ly/ALS2021Dec>

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Any inquiries can be addressed to arieleal@mcmaster.ca

Panelists:

- Sadaf Rahmanian**
Reading Lab alumni
- Tess Hudson**
Syntax Lab alumni
- Dr. Rober Boshra**
Language, Memory and Brain Lab alumnus

Event poster - Panel discussion on career planning organized by ARiEAL Operations Team (Image provided by Chia-Yu Lin)

LEARNING SERIES

Dr. Rober Boshra, Postdoctoral Associate, Princeton Neuroscience Institute, Princeton University: Princeton, America; Tess Hudson, Research Coordinator, Musculoskeletal Oncology Unit, McMaster University: Hamilton, Canada; & Sadaf Rahmanian, Associate Technical Writer, Vena Solutions: Toronto, Canada. Life After ARiEAL - Career Planning. December 08, 2021.

Shahithra Kirubalingam, Master's Student, Faculty of Health Sciences, McMaster University: Hamilton, Canada; Carla Weigel, ARiEAL Alumna, Department of Linguistics and Languages, McMaster University: Hamilton, Canada; & Nadia Lana, PhD Student, Department of Linguistics and Languages, McMaster University: Hamilton, Canada. Graduate School Q & A. October 21, 2021.

Rachelle Ho, PhD Student, Department of Psychology, Neuroscience & Behaviour, McMaster University: Hamilton, Canada. Finding an Academic Supervisor. July 22, 2021.

Rachelle Ho, PhD Student, Department of Psychology, Neuroscience & Behaviour, McMaster University: Hamilton, Canada. Captivating Your Online Audience. June 28, 2021.

Sheereen Harris, PhD Candidate, Department of Kinesiology, McMaster University: Hamilton, Canada. How to Stay Motivated and Active During the COVID-19 Pandemic. February 21, 2021.

SPEAKER SERIES

Dr. Tania Ionin, Professor, Department of Linguistics, University of Illinois at Urbana-Champaign: Champaign, USA. Investigations into word order and information structure in the Russian of heritage speakers and second language learners. December 3, 2021.

Dr. Penny Pexman, Professor, Department of Psychology, University of Calgary: Calgary, Canada. Grasping Word Meaning: Sensorimotor and Emotion Effects in Lexical Development. June 10, 2021.

Dr. Sid Segalowitz, Professor, Department of Psychology, Brock University: Niagara, Canada. Accessing words in the Mental Lexicon with ERPs: Are words 'perceived' in the same way as faces and objects? May 21, 2021.

Dr. Denise Klein, Associate Professor, Department of Neurology and Neurosurgery, McGill University: Montreal, Canada. Language experience and its role in changing our brains. April 8, 2021.

Prof. Loretta Ross, Visiting Associate Professor, Program for the Study of Women and Gender, Smith College: Northampton, USA. Calling In the Calling Out Culture. March 25, 2021.

Operations Team

ARiEAL established a trainee-based operations team (hereafter referred to as AOT) in 2020. The trainees work collaboratively with ARiEAL manager, Chia-Yu Lin, to support ARiEAL's effort on event planning and knowledge mobilization. The AOT operates on a one-year renewable term and provides hands-on opportunities for undergraduate and graduate trainees to not only participate but also lead the endeavours in knowledge mobilization and the planning of various events. ARiEAL was able to continue expanding its reach through Twitter and Instagram with the leadership demonstrated by Nadia Lana and Mariam Bekhet (Knowledge Mobilization Coordinator and Assistant, respectively). Despite the continued lockdown caused by the COVID-19 pandemic, Sukhman Baath and Fiza Ahmad (Learning Series Coordinators) braved the challenges and brought us events such as "How to Captivate Online Audience" and "Life After ARiEAL – Career Planning". ARiEAL's own GatherTown equipped with mini games, organized by Catherine Bosyj (Social Coordinator), offered the much-needed breaks that the ARiEAL community can enjoy and connect with one another.

EDI

Under the new directorship of Dr. Ivona Kučerová (2021-2026; 5-year renewable term), first and foremost, ARiEAL aims to refine its values, mission and vision statements and to implement a revised plan to actively engage international trainees/scholars especially those from the five countries identified in the 2016 Senate approved proposal for the establishment of ARiEAL (i.e., Brazil, Cuba, Ghana, Jamaica, and Nigeria). The planning of these initiatives started in 2021 and are expected to be completed in 2022. ARiEAL strives to incorporate the principles of Equity, Diversity and Inclusion at each stage of planning.



The ARiEAL Operations Team 2021-2022 (Images provided by each AOT member)

THE CENTRE

Founded in late 2016, ARiEAL Research Centre celebrated its fifth full calendar year since its inception in 2021. We are proud of the mentorship demonstrated by our researchers and our amazing trainees of all levels.

Members

DIRECTOR (FROM JULY 1, 2021 ONWARDS)

Dr. Ivona Kučerová (Department of Linguistics and Languages, McMaster University)

FOUNDING DIRECTOR

Dr. John Connolly (Department of Linguistics and Languages, McMaster University)

ASSOCIATE DIRECTOR

Dr. Anna Moro (Department of Linguistics and Languages, McMaster University)

FULL MEMBERS

Dr. Catherine Anderson (Department of Linguistics and Languages, McMaster University)

Dr. Sue Becker (Department of Psychology, Neuroscience & Behaviour, McMaster University)

Dr. Marc Joanisse (Department of Psychology, University of Western Ontario)

Dr. Victor Kuperman (Department of Linguistics and Languages, McMaster University)

Dr. Michael Noseworthy (Department of Electrical and Computer Engineering, McMaster University)

Dr. Daniel Pape (Department of Linguistics and Languages, McMaster University)

Dr. Jim Reilly (Department of Electrical and Computer Engineering, McMaster University)

Dr. Elisabet Service (Department of Linguistics and Languages, McMaster University)

Dr. Lyn Turkstra (School of Rehabilitation Science, McMaster University)

ASSOCIATE MEMBERS

Dr. Lisa Archibald (Department of Psychology, University of Western Ontario)

Prof. Carol DeMatteo (School of Rehabilitation Science, McMaster University)

Paul Grunthal (McMaster Industry Liaison Office, McMaster University)

Dr. Ranil Sonnadara (Department of Surgery, McMaster University)

Trainees

POSTDOCTORAL FELLOWS

Dr. Elham Bagheri (Co-supervised by Dr. John Connolly and Dr. Jim Reilly)

Dr. Jason Bernard (Supervised by Dr. Ranil Sonnadara)

Dr. Pan Liu (Co-supervised by Dr. Marc Joanisse and Dr. Elizabeth Hayden)

Dr. Lien Peters (Co-supervised by Dr. Marc Joanisse and Dr. Daniel Ansari)

Dr. Theresa Pham (Supervised by Dr. Lisa Archibald)

Dr. Daniel Schmidtke (Supervised by Dr. Anna Moro)

Dr. Mojtaba Soltanlou (Co-supervised by Dr. Marc Joanisse and Dr. Daniel Ansari)

Dr. Paniz Tavakoli* (Supervised by Dr. John Connolly)

Dr. Melissa Troyer (Co-supervised by Dr. Marc Joanisse and Dr. Ken McRae)



L.R. Wilson Hall – the home of ARIEAL (Photo Credit: Georgia Kirkos)

PHD STUDENTS

Hubert Banville (Supervised by Dr. Sue Becker)

Rachel Benninger (Supervised by Dr. Lisa Archibald)

Leah Brainin (Supervised by Dr. Marc Joannis)

Fiona Campbell (Supervised by Dr. Lyn Turkstra)

Mohammad Chaposhloo (Supervised by Dr. Sue Becker)

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Ethan Danielli (Supervised by Dr. Michael Noseworthy)

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Jordan Gallant (Supervised by Dr. Elisabet Service)

Rudaina Hamed (Co-supervised by Dr. Victor Kuperman and Dr. Anna Moro)

Adianes Herrera (Supervised by Dr. John Connolly)

Lisa Kakonge (Supervised by Dr. Lyn Turkstra)

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Isaac Kinley (Supervised by Dr. Sue Becker)

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Pekka Lahti-Nuuttila (Co-supervised by Dr. Elisabet Service and Dr. Marja Laasonen)

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Yarden Levy (Co-supervised by Dr. Sue Becker and Dr. Margaret McKinnon)

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Martyna Michalska (Co-supervised by Dr. Daniel Pape and Dr. Marzena Żygis)

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Gaisha Oralova (Co-supervised by Dr. John Connolly and Dr. Victor Kuperman)

Bre-Anna Owusu (Supervised by Dr. Elisabet Service)

PHD STUDENTS (CONT'D)

Kaitlyn Parks (Supervised by Dr. Marc Joanisse)
Sara Pearsell (Supervised by Dr. Daniel Pape)
Theresa Pham* (Supervised by Dr. Lisa Archibald)
Jade Plym (Co-supervised by Dr. Elisabet Service and Dr. Marja Laasonen)
Paul Polak (Supervised by Dr. Michael Noseworthy)
Adam Politis (Supervised by Dr. Lyn Turkstra)
Frederico Prado (Supervised by Dr. Ivona Kučerová)
Fareeha Rana (Co-supervised by Dr. John Connolly and Dr. Elisabet Service)
Saurabh Shaw* (Supervised by Dr. Sue Becker)
Nicolas Simard (Co-supervised by Dr. Michael Noseworthy and Dr. Jim Reilly)
Selena Singh (Supervised by Dr. Sue Becker)
Lauren Smail (Co-supervised by Dr. Sue Becker and Dr. Ranil Sonnadara)
Ali Torabi (Supervised by Dr. Jim Reilly)
Maryam Torabi (Co-supervised by Dr. Jim Reilly and Dr. Shahram Shirani)
Meghan Vollebregt (Supervised by Dr. Lisa Archibald)
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Aya Zarka (Supervised by Dr. Ivona Kučerová)

MASTER'S STUDENTS

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Lauren Anderson (Supervised by Dr. Michael Noseworthy)
Deewa Anwarzi (Co-supervised by Dr. Sue Becker and Dr. Sukh Obhi)
Kaitlyn Battershill (Supervised by Dr. Victor Kuperman)
Jean-François Berthiaume (Supervised by Dr. Daniel Pape)
Kurtis Commanda (Supervised by Dr. Ivona Kučerová)
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Ashley Gilbank (Supervised by Dr. Michael Noseworthy)
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Farah Hasan (Supervised by Dr. Ranil Sonnadara)
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Monika Krizic (Supervised by Dr. Daniel Pape)
Nadia Lana* (Supervised by Dr. Victor Kuperman)
Dakyung (Rachel) Lim (Co-supervised by Dr. Daniel Pape and Dr. Magda Stroinska)

Gwenyth Lu (Supervised by Dr. John Connolly)
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Kestrel McNeill* (Supervised by Dr. Ranil Sonnadara)
Leila Mousapour* (Co-supervised by Dr. Sue Becker and Dr. John Connolly)
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Carla Weigel* (Co-supervised by Dr. Daniel Pape and Dr. Magda Stroinska)
Heather Wild (Supervised by Dr. Victor Kuperman)
Ziqi (Jordan) Yang (Supervised by Dr. Elisabet Service)
Zhongda Zhang (Supervised by Dr. Jim Reilly)
Calvin Zhu (Supervised by Dr. Michael Noseworthy)

**Completed program in 2021*

Operations Support

MANAGER, DEVELOPMENT & RESEARCH

Chia-Yu Lin

STUDENT ASSISTANTS

Ashumi Doshi (January – April 2021)

Vidhi Patel (May – December 2021)

OPERATIONS TEAM

Knowledge Mobilization Coordinators/Assistant

Deewa Anwarzi (January – April 2021)

Mohammad Chaposhloo (January – April 2021)

Nadia Lana (April – December 2021)

Mariam Bekhet (April – December 2021)

Learning Series Coordinators

Mariam Bekhet (January – April 2021)

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Sukhman Baath (January – April 2021)

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Catherine Bosyj (April – December 2021)

Speaker Series Coordinator

Leila Mousapour (January – April 2021)

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Dr. Sylvain Baillet (McGill University)

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Dr. Penny Pexman (University of Calgary)

Dr. Ken Pugh (Haskins Laboratories)

Dr. Sid Segalowitz (Brock University)

Dr. Jon Sprouse (University of Connecticut)

Collaborators

Bundled Arrows Inc., Niagara Falls, NY, United States

Centro de Ciencia Cognitiva (C3), Madrid, Spain

Haskins Laboratories, New Haven, Connecticut, USA

Khovd State University (Department of Foreign Languages and Culture Studies, School of Social Sciences and Humanities), Khovd, Mongolia

Onkwawenna Kentyohkwa, Ohsweken, ON, Canada

Twatati Oneida Language Committee, Southwold, ON, Canada

University of Turku (Department of Psychology and Speech-Language Pathology), Turku, Finland

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ARiEAL Research Centre
L.R. Wilson Hall, Room 4020
McMaster University
1280 Main St. West
Hamilton, Ontario L8S 4K1

Phone: 905-525-9140 x21032
Email: ariealrc@mcmaster.ca
Website: arieal.mcmaster.ca
Twitter: @ARiEAL_Research
Instagram: @ariealrc