2023 has been another transformational year for ARIEAL Research Center. While in 2022 we defined our short- and long-term research goals and reaffirmed our commitments to equitable research and research practices that benefit members of underrepresented and equity-seeking academic and non-academic communities, in 2023 we furthered our research and training excellence, and built foundations for further growth and a closer alignment of our research and training activities with the real-world needs.

Last year, ARIEAL officially became a core research platform, a commercialization program, which allows us to better utilize our existing resources and to provide a wider variety of training opportunities, and potential collaborations within and outside of academia. Leveraging our specialized spaces and research equipment and our expertise in interdisciplinary research that combines human health, culture, societal, clinical, and community-based research, we aim to provide academic researchers, community members, and industry partners access to our full-cycle language analysis package, from conception, to experimentation, to knowledge mobilization. In time, we anticipate that this program will create training and networking opportunities for our graduate and undergraduate students and trainees within and beyond academia and create meaningful research collaborations between ARIEAL and researchers, community partners, and industry partners.

We have also been fortunate to welcome two early career researchers to ARIEAL: Drs. Phoebe Gaston and Christian Brodbeck. An Assistant Professor in the Department of Linguistics and Languages, Dr. Gaston comes to us from the University of Maryland and the University of Connecticut. Her innovative research focuses on word recognition, lexical representation, syntactic structure-building, and the neural and cognitive mechanisms for top-down context effects in language comprehension. Dr. Brodbeck is an Assistant Professor in the Department of Computing and Software at McMaster University. Working primarily with electrophysiological brain signals (MEG & EEG) and computational models, Dr. Brodbeck is especially interested in understanding and measuring how our brains process speech. At the same time, we said goodbye to one of the inaugural members of our research centre in 2023. Dr. Jim Reilly, an internationally renowned researcher and now a Professor Emeritus at McMaster University, has produced groundbreaking research in the field of signal processing and has played a key role in the growth and expansion of ARIEAL Research Centre. We are grateful to his contributions to ARIEAL. Thank you, Jim!

Our new members, Drs. Gaston and Brodbeck, further contribute to our ongoing aim to align our future research and training activities with real-world needs with their expertise in Artificial Intelligence technologies that we expect to become an important research direction in our field. This potential research direction also aligns well with a new research partnership with the Department of Cognitive Science and Artificial Intelligence at Tilburg University, a department that focuses specifically on AI, neuroscience, and linguistics.

2023 was a very good year for ARIEAL research. Our researchers published 47 journal articles, 19 proceeding papers, one book chapter, and one book. They also presented 44 academic papers, posters, and invited talks at numerous high-profile international conferences and academic institutions around the world. Many of these publications and presentations were co-authored and co-presented with our trainees, highlighting their importance to the knowledge mobilization and research activities at ARIEAL and the quality of the training and mentoring they receive from our members. ARIEAL and ARIEAL researchers have also secured 17 grants to fund research, knowledge mobilization, and training activities, totalling more than 26 million dollars. These research funds will allow ARIEAL researchers to further develop their cutting-edge research and create new collaborations with academics and community partners around the world. To name a few: working with researchers from Lesya Ukrainka Volyn National University, Dr. Victor Kuperman started a new project (funded by a NFRF Exploration grant) that records how the war in Ukraine is impacting Ukrainian civilians. Dr. Michael Noseworthy received several grants to further his ground-breaking research on magnetic resonance imaging, and Dr. Alison Biggs received a SSHRC grant allowing her to continue and expand her research on Southern Min. Special congratulations to Dr. Ranil Sonnadara who won very significant funding through highly competitive awards that support investments in Ontario’s Digital Research Infrastructure!

The year 2023 further allowed us to act upon our commitments to equitable research. Particularly, a pilot of a new International Visiting Scholar Program launched in 2023, with the first cohort having joined our labs in Winter 2024. Our objective with this program is to provide support for international researchers and students — whose research activities align with that at ARIEAL — to spend four months in our research center and collaborate on our research projects. We received numerous applications from all over the world and four talented early career researchers arrived this winter.
Once again, I am grateful for the tremendous work that my colleagues and our trainees have done in 2023 and continue doing. Your contributions to the research, knowledge mobilization, and training activities at ARIEAL and commitments to our values have been inspiring and you have all played an important role in making ARIEAL a leader in applied and experimental linguistics.

I must, however, also acknowledge that 2023 was not an easy year. The war in Ukraine continues to negatively impact our colleagues abroad and trainees here at ARIEAL. More recently, events in Israel and Gaza have divided (and continue to divide) our communities, including here at McMaster. While we may hold different beliefs and opinions, I hope we can retain a sense of empathy towards one another and support those of us that are directly or indirectly affected.

Wishing you all a safe, peaceful, healthy, and productive year, and even more good science.

Felix Kpogo, a doctoral candidate from Ghana at Boston University, joined the Phonetics Lab, Dr. Mary Amaechi, a lecturer at the University of Ilorin in Nigeria, joined the Syntax Lab, Dr. Renan Ferreira, a visiting postdoctoral researcher from Brazil, joined the MELD Bilingualism lab, and Esther Vicente Manzanedo, a doctoral candidate from Spain at the University of East Anglia, joined the Language, Memory, and Brain Lab. ARIEAL was able to provide funding for airfare, lodging, some living expenses, and other incidental fees for this group of international visitors. Along with our continued support of Ukrainian scholars that have been displaced from their homes due to the continued war in Ukraine and the arrival of trainees and visiting researchers from around the world including Oman, Brazil, and Mongolia, we strive to make ARIEAL a welcoming place for all.

As always, our trainees remain a critical part of the research, knowledge mobilization, and training activities at ARIEAL. Not only do they play an active role in the research taking place in our laboratories, but several of our trainees also co-authored and published articles in high profile journals and co-presented their research at prominent conferences around the world. Members of the ARIEAL Operational Team also played an important role in the creation of professionalization activities in 2023, assisting in the organization of several workshops on topics such as networking and grant writing and hosting several workshops themselves.

Thanks to a grant from the Paul R. MacPherson Institute for Leadership, Innovation, and Excellence in Teaching and the hard work of our trainees, we also launched a K-12 student outreach program that aims to introduce students from underrepresented and racialized backgrounds from the Greater Hamilton and Toronto areas to ARIEAL Research Center, our laboratories, and our research. Programs such as these are critical for promoting the value of language sciences and making them accessible to prospective students from varied backgrounds.

PHOTO CREDIT: COLIN CZERNEDA C/O MCMASTER UNIVERSITY
In 2023, we welcomed Dr. Christian Brodbeck to ARIEAL Research Centre. Dr. 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 backgrounds. Dr. Brodbeck primarily works with electrophysiological brain signals – electroencephalogram (EEG) and magnetoencephalogram (MEG) – and computational models. M/EEG allows 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 for brain activity.

In 2023, Dr. Brodbeck published several peer-reviewed articles, many in high impact journals, including Neurobiology of Language, eLife, Journal of Neuroscience, and Hearing Research. His research was also presented at numerous international conferences, including at the Society for the Neurobiology of Language, held in Marseille, France, and at the Association for Research in Otolaryngology, held in Orlando, Florida. Dr. Brodbeck also won a prestigious National Institutes of Health (NIH) grant (as a co-investigator) for a project titled the “Neurocognitive Mechanisms of Sentence Production Impairment in Aphasia.”

In 2023, Dr. Alison Biggs was the recipient of numerous research and training grants, including an Arts Research Board grant for a project titled “Establishing a research relationship: A case study in modes of comparison in Shantou Teochew” and a Social Sciences and Humanities Research Council of Canada (SSHRC) Insight Development Grant for a project titled “The grammar of standards in Southern Min: Implications for the role of syntax in contextual vagueness resolution.” Dr. Biggs was also invited to present her research at Concordia University and the University of Toronto, and presented a paper titled “On the interpretation and structure of English stative passives” at the Linguistics Association of Great Britain. Four new trainees joined Dr. Biggs’ Grammatical Theory Group in 2023: Haiyang Liu (doctoral student), Braulio Lopes (doctoral student), Derya Sonmez (master’s student), and Jacob Rice (undergraduate student).
In 2023, we also welcomed Dr. Phoebe Gaston to ARIEAL Research Centre. Dr. Gaston is an Assistant Professor in the Department of Linguistics and Languages. She specializes in psycholinguistics and the cognitive neuroscience of language. Her research is focused on word recognition, lexical representation, syntactic structure-building, and the neural and cognitive mechanisms for top-down context effects in language comprehension. She uses behavioral, electrophysiological, and neuroimaging data as well as computational modeling approaches.

In 2023, Dr. Gaston published two-peer reviewed articles: "Eelbrain: A Python toolkit for time-continuous analysis with temporal response functions" in eLife and "Auditory word comprehension is less incremental in isolated words" in Neurobiology of Language. She also co-authored a presentation titled "Predictability effects on auditory word recognition in a novel priming paradigm" at the 64th Annual Meeting of the Psychonomic Society, held in San Francisco, California.
Dr. Michael Noseworthy is a professor in Electrical and Computer Engineering and Associate Chair (Research), Department of Medical Imaging. Also, he is 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 assessment of 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 his research team studies physiological problems and diseases using advanced medical imaging techniques.

In 2023, Dr. Noseworthy and his team published over a dozen articles, including many in high impact journals, such as Journal of Concussion, Frontiers in Physiology, Frontiers in Neurology, Journal of Concussion and Pediatric Exercise Science. Dr. Noseworthy also won a prestigious Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant for a project investigating multimodal non-invasive assessment of healthy neuromuscular activity and two Southern Ontario Pharmaceutical and Health Innovation Ecosystem (SOPHIE) grants, one for a project investigating the development and testing diffusion tensor imaging (DTI) phantoms for magnetic resonance imaging (MRI) and a second investigating the optimization of concussion diagnostics AI tool. Three of Dr. Noseworthy’s graduate students – Mason Kadem, Alejandro Amador-Tejada, and Mahnaz Tajik – received their master’s in 2023. Congratulations!
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. Her research is on first and second language acquisition, spoken word processing, and other related cognitive processes. Much of this work is then applied in investigations of language disorders including dyslexia. Dr. Connolly’s work uses EEG methods to study brain health and language functions.

In 2023, Dr. Service continued to serve as the chair the Department of Linguistics and Languages. Dr. Service presented a paper titled “Priming with musical rhythm enhances verbal working memory” at the Annual Meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science, held in Guelph, Ontario, and a paper titled "Short-Term Memory in Language Acquisition: Phonology or Temporal Structure?" at the 64th Annual Meeting of the Psychonomic Society, held in San Francisco, California. Dr. Service continued research on two major funded projects: a project investigating the impact of temporal patterns on short-term memory for speech and on language learning, funded by a NSERC Discovery grant, and a project investigating the effects of working in a second language on strategic thinking, funded by a SSHRC Insight grant. Finally, two of Dr. Service’s trainees — Lan (Conan) Hu and Ziqi (Jordan) Yang — completed their master’s and one of her trainees — Adrienne Yau — completed their undergraduate degree in 2023. She also welcomed Mary Edwards (PhD, University of Brighton) as a postdoctoral fellow to her lab. Congratulations!

MELD BILINGUALISM 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 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.

The MELD Bilingualism Lab investigates the underlying linguistic mechanisms of bilingual phenomena and focuses on second language development. In 2023, along with research associate Dr. Daniel Schmidtke, Dr. Moro published an article titled, “Tracking reading development in an English language university-level bridging program: evidence from eye-movements during passage reading” in Bilingualism: Language and Cognition. Dr. Moro also presented a research paper titled "Investigating the long-term effects of reading ability growth during L2 instruction on later reading skill: A longitudinal eye-tracking study” at the 64th Annual Meeting of the Psychonomic Society, held in San Francisco, California.
**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 recently introduced new research stream examines whether different populations produce differences in their speech patterns, and how these differences are manifested in their cognition. More specifically, the Phonetics Lab examines how (non-clinical) autism spectrum disorder differences in students manifest in their spoken speech and how that would help in the communication between students differing in autism spectrum disorder. A second stream examines production and perception differences of bilingual and non-native speakers with different degrees of proficiency in their different spoken languages, using ultrasound methods and acoustics.

In 2023, Dr. Pape won a postdoctoral research grant from the Scholars at Risk Program at McMaster University, allowing Dr. Maiia Bulakh to remain at ARIEAL and the Phonetics Lab from Ukraine. Together with ARIEAL trainee Sara Pearsell, Dr. Pape also published articles in LACUS Forum and Frontiers in Communication. Dr. Pape and his team – which includes ARIEAL Research Associate Dr. Gemma Repiso-Puigdelliura and ARIEAL Trainees Monika Krizic, Dakyung (Rachel) Lim, and Michelle Middaugh-Cifuentes – also published articles in numerous journals and conference proceedings, including Journal of Phonetics, LACUS Forum and the Proceedings of the International Conference of Phonetic Sciences. Finally, Dr. Pape presented his research at various international conferences, including at Hanyang International Symposium on Phonetics and Cognitive Sciences of Languages, held at Hanyang University in Seoul, South Korea, the Canadian Symposium of Language and Law, held at York University in Toronto, the International Conference of Phonetic Sciences in Prague, the Linguistic Association of Canada and United States’ 49th conference, held at the University of Toledo in Ohio, and multiple contributions to the local conference [motʰ], the Montreal-Ottawa-Toronto-Hamilton Phonology/Phonetics workshop.
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 2023, Dr. Becker’s brilliant career as a researcher and professor was rewarded with a Professor Emerita status at McMaster. Dr. Becker and her team also published several articles in high impact journals including NeuroImage: Clinical, Hippocampus, and Canadian Journal of Pain. Finally, several of her trainees completed their degrees this year: Isaac Kinley received their doctorate, Deewa Anwarzi their Master’s of Science, and Sandy Luu, Serenna Gerhard, Varun Jain, Gareth Mann, Katriel Read, Colin Porter, and Tess Vosper all received their undergraduate degrees. Congratulations!

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 2023, Dr. Kuperman published several articles in high impact journals, including Language, Behavior Research Methods, Mental Lexicon, Journal of Civic Society, Experimental Aging Research, and Language Development and Learning. Dr. Kuperman was also the recipient of two major grants. First, he was a co-Investigator on a winning SSHRC Insight Development Grant for a project titled “New techniques to take the pulse of written language production in Canada” (PI Dr. Gary Libben, Brock University). He also received a prestigious New Frontiers Research Foundation (NFRF) Exploration Grant for a project titled “The language of trauma in testimonies of the Russia-Ukraine war.” Working with Larysa Zasiekina (Lesya Ukrainka Volyn National University), Serhii Zasiekin (Lesya Ukrainka Volyn National University), and Myron Groover (William Ready Division of Archives and Research Collections, McMaster Library), this project aims to collect, share, and record how the Russian invasion impacted the people of Ukraine. Along with Dr. Olaf Klaus de Camargo (Department of Pediatrics), Dr. Kuperman has also been working with CBC Kids on ways to improve closed captions in children’s programming. In 2023, three of Dr. Kuperman’s trainees – Heather Wild, Emilie Altman, and Daniil Gnetov – completed their Master of Science. Congratulations!
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 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 and assessment of health professionals, musicians, and athletes. In 2023, Dr. Sonnadara’s lab published an article titled “Automated grading of anatomical objective structured practical examinations using decision trees: An artificial intelligence approach” in Anatomical Sciences Education. The Performance Science Lab is also exploring the importance of creativity. “Investigating divergent thinking and creative ability in surgeons (IDEAS): a survey protocol” was published in BMJ open. In 2023, Dr. Sonnadara also won several awards to support investments in Digital Research Infrastructure in Ontario. Several of Dr. Sonnadara’s trainees also completed their degrees: Dr. Charles Jason Bernard completed his postdoctoral fellowship and Dr. Portia Kalun their PhD, and several undergraduate students completed their studies as well. Congratulations!

In 2023, Dr. Kučerová and her team won several research grants and awards, including two SSHRC Insight Development Grants for projects titled “Syntax in the brain: EEG exploration of syntactic dependencies in typologically distinct languages” and “Understanding Kanien’kéha verbs: Linguistic research and language revitalization.” Dr. Kučerová and her postdoctoral fellow, Dr. Alina Dochu, also won a Scholars at Risk: USA Network Ukraine Fellowship, which will keep Ukrainian scholar Dr. Dochu at ARiEAL until 2025. Dr. Kučerová also published two articles with the Journal of Slavic Linguistics and presented her research at various international conferences and guest lectures, including at the 41st West Coast Conference on Formal Linguistics, held at the University of California in Santa Cruz, California, and the 32nd Colloquium on Generative Grammar at the University of the Basque Country, held in Vitoria-Gasteiz, Spain. Dr. Kučerová also welcomed two new doctoral students – Kurtis Commanda and Meagan Nuculaj – to her lab. Finally, Meagan Nuculaj also completed their master’s degree and Frederico Prado their PhD in 2023 under Dr. Kučerová’s supervision. Congratulations Meagan and Frederico!
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.

In the past year, Dr. Turkstra and her research team have published their research in several high impact journals, such as PLOS One, Journal of Head Trauma Rehabilitation, Brain Injury, International Journal of Language & Communication Disorders, Proceedings of the 25th International ACM SIGACCESS Conference on Computers and Accessibility, Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems, and Clinical Orthopaedics and Related Research. Dr. Turkstra was the keynote speaker at the 100th Anniversary Jubilee of the Danish Association of Speech and Language Pathologists and presented at the 14th World Congress on Brain Injury, held in Dublin, Ireland; and members of her research group presented at international meetings such as the ACM CHI Conference on Human Factors in Computing Systems, held in Hamburg, Germany. Three of Dr. Turkstra’s undergraduate students – Elena Gamm, Tasin Karim, and Sunny Kim – completed their honour’s theses this year. Elena Gamm investigated cognitive-communication disorders after pediatric traumatic brain injuries; Tasin Karim studied effects of mild traumatic brain injuries on veterans’ interactions with family members; and Sunny Kim collaborated with Turkstra Lab PhD candidate Lisa Kakonge, to consider interventions for multilingual children with cognitive-communication disorders after traumatic brain injuries.
BY THE NUMBERS

Knowledge mobilization is at the core of the mission, values, vision, and strategic planning at ARIEAL. We not only strive to produce interdisciplinary, collaborative, and ethical research, but we strive to produce research that impacts academic knowledge and benefits society. In 2023, our researchers have been very active disseminating their ground-breaking 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, awards, and funding.

PUBLICATIONS

In 2023, ARIEAL researchers have published over 68 texts, including 1 book, 1 book chapter, 47 journal articles, and 19 articles in conference proceedings. These publications highlight the breath of the research being done at ARIEAL. Broadly speaking, publication topics include neurodevelopmental disorders and mental health, traumatic brain injuries, artificial intelligence, language learning, and post-traumatic stress disorders. These publications speak to the tremendous impact that our researchers had in their respected fields as they have all published in several high impact publications.

BOOKS (1)


JOURNAL ARTICLES (47)


BOOK CHAPTERS (1)

JOURNAL ARTICLES (CONT)


JOURNAL ARTICLES (CONT)


PRESENTATIONS

Researchers have presented over 44 academic papers, posters, and invited talks over the course of 2023. Our researchers have presented their cutting-edge research in numerous high profile international conference and academic institutions around the world, which speaks to the global impact that our researchers and laboratories have on their respected fields.

Acai, A., Hanmore, T., Andrew, M., Askari, S., Hussain, M., Sonnadara, R. R. & Trier, J. (2023, April)/ A realist, multi-site comparison of competence committee implementation practices. The inaugural International Congress on Academic Medicine, Quebec City, Canada.

Amador-Tejada, A., McGillivray, J.E., de Bruin, H. & Noseworthy, M.D. (2023, October). Denoising of the gradient artifact present in simultaneous studies of muscle blood oxygen level dependent (BOLD) signal and electromyography (EMG). European Society for Magnetic Resonance in Medicine and 2023 Online 39th Annual Scientific Meeting, Basel, Switzerland.


Biggs, A. (2023, November). Building adjectives: The role of syntax in resolving the interpretation of vague predicates. Invited talk at Concordia University, Montreal, Canada.


Brodbbeck, C. (2023). Neural mechanisms of Speech processing in continuous speech. Invited talk at the University of Glasgow, Glasgow, United Kingdom.


Kučerová, I. (2023, January). Discussion panel: Regeneration and resurgence. Faculty of Humanities Seminar, McMaster University, Hamilton, Canada.


Kučerová, I. (2023, January). Discussion panel: Regeneration and resurgence. Faculty of Humanities Seminar, McMaster University, Hamilton, Canada.


Pape D.
PRESENTATIONS (CONT)


Nowikow, C., Sharma, B. & Noseworthy M.D. (2023, October). The lack of B0 maps in rs-fmri databases: A big problem or no big deal? European Society for Magnetic Resonance in Medicine and 2023 Online 39th Annual Scientific Meeting, Basel, Switzerland.


Pearsell, S. & Pape D. (2023, July). The effects of different allophonic variations on the perceived personality of speaker. 49th Conference of the Linguistic Association of Canada and United States, University of Toledo, Toledo, USA.

Pearsell, S. & Pape, D. (2023, August). The effect of different levels of amplitude variation on perceived speaker dominance. 20th International Congress of Phonetic Sciences (ICPhS), Prague, Czech Republic.


Repiso-Puigdeliura, G. & Pape, D. (2023, August). Examining the effects of stress on vowel production in heritage vs. monolingual Spanish school-aged child speakers. 20th International Congress of Phonetic Sciences (ICPhS), Prague, Czech Republic.


Stroinska, M., Pape D. & Eranovic, J. (2023, July). Court interpretation in post-pandemic online courtrooms. 49th conference of the Linguistic Association of Canada and United States, University of Toledo, Toledo, USA.

GRANTS

2023 was another big year for ARiEAL and ARiEAL researchers as we have secured more funding for our research, knowledge mobilization, and training activities. ARiEAL and ARiEAL researchers have won 17 new grants, totalling more than 26 million dollars, as Principal Investigator and co-applicants from both internal and external sources. Funding sources include McMaster University, Canadian Institute of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC), Social Sciences and Humanities Research Council (SSHRC), New Frontiers in Research Fund (NFRF), Ministry of Colleges and Universities, as well as various other foundations and institutions.

**Biggs, A.** The grammar of standards in Southern Min: Implications for the role of syntax in contextual vagueness resolution. Social Sciences and Research Council (SSHRC) Insight Development Grant, $74,820, 2023-25.

**Biggs, A.** Establishing a research relationship: A case study in modes of comparison in Shantou Teochew. Arts Research Board, McMaster University, $7000, 2023-25.


**Dagenais, M.** ARiEAL outreach program for underrepresented high school students. Paul R. MacPherson Institute for Leadership, Innovation, and Excellence in Teaching (McMaster University), Student Partners Program, $2,000, 2023.


**Kučerová, I.** Language policies for Indigenous languages: A postdoctoral fellowship for Dr. Alina Dochu Scholars at Risk USA Network Ukraine Fellowship, $135,756.00, 2023-25.

**Kučerová, I. & Dagenais, M.** Experiential digital learning through ARiEAL. Ministry of Colleges and Universities (Ontario, Canada), Training Equipment and Renewal Fund, $24,000, 2023-24.

**Kučerová, I. & Sprouse, J.** Syntax in the brain: EEG exploration of syntactic dependencies in typologically distinct languages. SSHRC Insight Development Grant, $72,943, 2023-25.


**Kuperman, V.** & Libben, G. (PI). New techniques to take the pulse of written language production in Canada. SSHRC Insight Development Grant, $60,000, 2023-25.

**Noseworthy, M.D.** Development and testing diffusion tensor imaging (DTI) phantoms for magnetic resonance imaging (MRI). Southern Ontario Pharmaceutical and Health Innovation Ecosystem (SOPHIE), $135,000, 2023.

**Noseworthy, M.D. & Pape, D.** Scholars At Risk Program Postdoctoral Research Grant (Dr. Maiia Bulakh). Office of the Vice-President Research, McMaster University, $65,065, 2023-24.


**Sonnadara, R.** Investing in Critical Digital Infrastructure to Advance Research and Innovation in Ontario. Ontario Ministry of Colleges and Universities Invited Funding Call, $21,200,000, 2023.
IMPACT

Every year, ARiEAL strives to produce ethically conscious research that engages with a diverse global scientific community and that impacts our broader society. 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 also launched our ARiEAL Research Magazine, which further allows us to further highlight our trainees research. In 2023, we launched our International Scholar Award Program, which aimed to provide an opportunity for researchers from the Global South and other underrepresented areas to join ARiEAL and collaborate on our research projects.

Finally, in 2023, we embarked on numerous new professionalization initiatives to further prepare our trainees for their future careers and started working on an extensive commercialization program that we anticipate will lead to several new training, research, and funding opportunities for ARiEAL, our researchers, and our trainees.

GLOBAL OUTREACH & COLLABORATIONS

ARiEAL has always been committed to expanding McMaster’s global outreach and international collaborations. In 2023, we expanded our commitments to support ethical and collaborative research with marginalized and underrepresented communities and support research that is guided by, for, and benefits marginalized and underrepresented communities around the world.

First, our International Scholar Award Program launched in 2023. Our program’s goal is to provide an opportunity for researchers from the Global South and other underrepresented areas to join ARiEAL and collaborate on our research projects. After reviewing over 40 applications from around the globe, we invited five researchers, including from Ghana, Bangladesh, Brazil, and Nigeria, to join ARiEAL in Winter 2024. As a part of this program, we are providing a stipend to help pay for airfare, accommodations, and some living expenses.

We also expanded our research network and international collaborations, particularly in the realm of Artificial Intelligence. There is no doubt that Artificial Intelligence is one of the next big emerging areas of research in language sciences. At ARiEAL, we fully anticipate 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 2023, we forged a new research partnership with the Department of Cognitive Science and Artificial Intelligence at Tilburg University, one of the world’s premier department’s that focuses specifically on AI, neuroscience, and linguistics.

Researchers from Tilburg joined us at ARiEAL in winter 2023 to discuss future research collaborations in the field of AI.

COMMERCIALIZATION INITIATIVE: ARiEAL CORE RESEARCH PLATFORM

In 2023, we started working on an extensive commercialization program that we anticipate will lead to several new training, research collaboration, and funding opportunities for ARiEAL, our researchers, and our trainees. Our first step was to apply to become a core research platform at McMaster University.

As a core research platform, we are able to provide a full-cycle research/knowledge translation service program – we take problems from “real world” settings (classrooms, our community, and clinical settings, to name a few), develop and implement a multi-methods research and experimental program to assess them, create and analyse the data in our lab, and from then on, communicate our findings to stakeholders, implement evidence-based solutions to their problems as well as measure their efficacy.

ARiEAL has specialized equipment and laboratories, including eye tracking, electroencephalography, ultrasound imaging, high quality sound recording, online experimentation, and high-performance computing. We have the expertise to provide consultations and leadership for teams and individual researchers in academic, not-for-profit, industry, and health-care settings in experiment design, methods of data collection, and analysis, relevant clinical, societal, and communal factors, as well as knowledge mobilization and science communication. While ARiEAL Core Research Platform is only a few months old, we have already secured our first research contract with CBC Kids/CanChild. ARiEAL is providing the equipment, technology, and expertise to generate data for our clients.
The year 2023 saw the return of many more in-person learning and speaker events at ARiEAL. We continued our tradition to invite world renown researchers, such as Dr. Hironori Katsuda and Drs. Larysa Zasiekin and Serhii Zasiekin. Particularly, in June 2023, we hosted a special event titled “The Narratives of War” at the David Braley Auditorium in downtown Hamilton and welcomed several members of the Hamilton community. Led by Dr. Victor Kuperman, Drs. Larysa and Serhii Zasiekin, Dr. Myron Groover, and our trainees, Dr. Maiia Bulakh, Olga Dvorova, and Emilie Altman, the research team discussed their research and their virtual exhibit that collected over 1,500 testimonies from Ukrainian civilians between May 2022 and now. This event was sponsored by McMaster Library, Office of International Affairs, Alumni, and Advancements Office. Through our Brown Bag series, we also encouraged our own community of researchers and trainees to share their work-in-progress, allowing all to workshop their work for some constructive feedback from our team. Particularly, Dr. Anna Moro presented her ground-breaking research on phonological similarity effects among university-aged bilinguals (L1 Mandarin or Cantonese) with modest proficiency in English and how her Bilingualism Lab in ARiEAL developed a comprehensive rime judgment task, controlling for a variety of factors, e.g., frequency and phonological complexity. Our doctoral trainee, Sara Pearsell, discussed her fascinating work on how different aspects of speech productions like voice quality, amplitude, and phonological variation affect perceptions of personality traits. Finally, Dr. Lauren Fink, director of the BEAT (Brain/Body Entertainment Attention & Timing) Lab at McMaster, introduced us to her cutting-edge research that seeks to understand how and why music moves us and bonds us so deeply.

In 2023, we also continued to organize and host learning series events for our trainees, with a further emphasis on research and career professionalization workshops. For instance, our graduate trainee, Ethan Stollar, hosted a workshop introducing our team to LaTeX. Nicole Gervais, from McMaster Research Ethics, also dropped by to discuss the research ethics process here at McMaster and why research ethics matters to trainees and researchers. Hosted by manager Dr. Maxime Dagenais, our special guests from the School of Graduate Studies, Antonella Masciantonio, and our team of ARiEAL trainees, Nadia Lana, Fiza Ahmad, and Emilie Altman, walked us through the world of graduate scholarships. They discussed the internal application process at Mac and their own experiences applying for funding. Finally, thanks to the support from Jared Kunar at the Student Success Center, we hosted a variety of workshops introducing our trainees to online networking and the resources available to them at McMaster that can help them reach their career goals.
In 2023, ARiEAL continued to grow and expand its website as a hub for both academics and the community-at-large. Particularly, working with Humanities Media and Computing, we created a series of accessible videos with several of our research lab directors, highlighting their research, the societal and academic implications of their research, and their teams of trainees. We have also expanded our community hub to include learning modules.

During 2023, our official Twitter handle reached 588 followers, with over 100 tweets and retweets and over 28,000 impressions. Our Instagram account, now with 542 followers (our primary social media platform) has continued to foster engagement, specifically with former and current undergraduate and graduate students, visiting scholars, and postdoctoral fellows. In 2023, we had over 75 posts, and over 1,260 likes.

One of our most popular series of posts on ARiEAL Instagram remains the Spotlight Series where our researchers, trainees, and staff were featured to share their research and fun facts about themselves. These have given us the opportunity to learn more about the research and individuals at ARiEAL and helped create a greater sense of community.

Through 2023, Instagram has also remained a valuable platform to promote research, knowledge mobilization, and learning activities at ARiEAL and engage with our researchers (past and present) and the broader academic and non-academic community.

TRAINEE PROFESSIONALIZATION INITIATIVES

Training undergraduate, graduate, and post-graduate students remains a core tenant of our priorities. In 2023, we embarked on numerous new professionalization initiatives to further prepare our trainees for their future careers.

First, we received 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 required in their future careers.

Our commercialization initiative aims to further expand training activities as it will allow our trainees to work (as researchers and research assistants) on new, cutting-edge industry-led projects. This will allow our trainees to have firsthand experiences with research approaches, methods, and objectives in a non-academic, professional setting. This will also allow our trainees to gain networking opportunities that will help them on the non-academic job market.

Finally, along with professionalization workshops that we hosted with the Student Success Center, we also started working on expanding our ARiEAL Alumni Network. Our goal is to invite ARiEAL Alumni to share with our trainees their experiences on the job market, the paths that led to their current employment and how their degrees in Language Science helped them find their jobs. In time, this Alumni Network will not only provide knowledge about how a degree in language sciences can help on the job market, but it will create networking that will help them on the non-academic job market.

VIRTUAL ENGAGEMENT

In 2023, ARiEAL continued to grow and expand its website as a hub for both academics and the community-at-large. Particularly, working with Humanities Media and Computing, we created a series of accessible videos with several of our research lab directors, highlighting their research, the societal and academic implications of their research, and their teams of trainees. We have also expanded our community hub to include learning modules.

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Through 2023, Instagram has also remained a valuable platform to promote research, knowledge mobilization, and learning activities at ARiEAL and engage with our researchers (past and present) and the broader academic and non-academic community.
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 2023, several of our trainees, from undergraduate to postdoctoral, research associates, and visiting researchers have published their research in several high impact journals, presented at numerous local and international conferences and community events, and won several prestigious awards.

GRANTS & AWARDS:

Khurana, S. Dean’s Honour List, McMaster University, 2023.

Kučerová, I. & Dochu, A. Language policies for Indigenous languages: A postdoctoral fellowship for Dr. Alina Dochu Scholars at Risk USA Network Ukraine Fellowship, $135,756.00, 2023-25.

Viswanathan, S. Dean’s Honour List, McMaster University, 2023.

Yau, A. Dean’s Honour List, McMaster University, 2023.

PUBLICATIONS:


PRESENTATIONS:

Amador-Tejada, A., McGillivray, J.E., de Bruin, H. & Noseworthy, M.D. (2023, October). Denoising of the gradient artifact present in simultaneous studies of muscle blood oxygen level dependent (BOLD) signal and electromyography (EMG). European Society for Magnetic Resonance in Medicine and 2023 Online 39th Annual Scientific Meeting, Basel, Switzerland.


Pearsell, S. & Pape, D. (2023, August). The effect of different levels of amplitude variation on perceived speaker dominance. 20th International Congress of Phonetic Sciences (ICPhS), Prague, Czech Republic.

Repiso-Puigdelliura, G. & Pape, D. (2023, August). Examining the effects of stress on vowel production in heritage vs. monolingual Spanish school-aged child speakers. 20th International Congress of Phonetic Sciences (ICPhS), Prague, Czech Republic.


OPERATIONS TEAM

In 2020, ARiEAL established a trainee-based operations team known as the ARiEAL Operations Team (hereafter referred to as AOT). Working collaboratively with ARiEAL manager, Dr. Maxime Dagenais, the AOT supports our center’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 the planning of 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 learning events on key professionalization topics such as online networking, LaTeX, and graduate scholarships, and organized some much-needed, light-hearted breaks from our research and work, including an intensively competitive games night that was won by the Syntax-Reading Lab Team. A rematch is coming soon!

Along with the AOT Team, ARiEAL also benefitted from a team of MacPherson Student Partners that helped develop and guide various projects to fruition. Thanks to the hard work of Bre-Anna Owusu, Monika Krizic, and Spencer Jarvis-Frain, the first volume of our ARiEAL Research Magazine was published and highlighted our trainees’ research. Volume 1 included five items: two long-form articles, two academic posters, and a short-form article. MacPherson Student Partner and ARiEAL AOT member, Fiza Ahmad, also spearheaded an important K-12 student outreach program. Our goal was to connect with local high schools and students from underrepresented racialized and socioeconomic backgrounds in the Hamilton area and introduce them to ARiEAL, university-based research, and the value of language science. Working in collaboration with former ARiEAL trainee Renee Booney and iStep, Fiza is organizing various workshops, highlighting several of our labs and their research, for local high school students in the Great Hamilton Region. These visits will take place in April 2024.

![Dr. Maxime Dagenais](image1)

![Brianna Griska-MacPhee](image2)

![Fiza Ahmad](image3)

**SCIENTIFIC ADVISORY COMMITTEE**

In 2023, we took important steps in the creation of our new EDI-conscious Scientific Advisory Committee (SAC). Following the advice provided by our EDI taskforce, we established guidelines for the composition, role, and size of the SAC. However, given our new focus on commercialization and industry partnerships, we have had to pivot and reconsider the composition of our Scientific Advisory Committee. Our next committee needs to be aligned with the vision and future objectives of ARiEAL Research Center and ARiEAL Core Research Platform. A call for submissions was sent and we are considering numerous applications.
THE CENTRE

Founded in late 2016, ARIEAL celebrated its seventh full calendar year since its inception in 2023. 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.

DIRECTOR
(From July 1, 2021 onwards)
Dr. Ivona Kučerova
(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)

SENIOR RESEARCH ASSOCIATES
Lori-Anne Davis Hill
(School of Rehabilitation Science, McMaster University)
Dr. Gemma Repiso-Puigdelliura
(Department of Linguistics and Languages, McMaster University)

OPERATIONS SUPPORT
Research Program Manager
Dr. Maxime Dagenais
Office Assistant
Siyuan Huang
(January - April 2023)

ARIEAL OPERATIONAL TEAM
Fiza Ahmad
(September-December 2023)
Harshdeep Dhaliwal
(January-April 2023)
Brianna Griska-Macphee
(September-December 2023)
Monika Krizic
(January-April 2023)
Fan Yang
(January-April 2023)

MEMBERS
Dr. Sue Becker
(Department of Psychology, Neuroscience & Behaviour, McMaster University)
Dr. Alison Biggs
(Department of Linguistics and Languages, McMaster University)
Dr. Christian Brodbeck
(Department of Computing and Software, McMaster University)
Arrived in Fall 2023
Dr. Lauren Fink
(Department of Psychology, Neuroscience & Behaviour, McMaster University)
Arrived in Winter 2024
Dr. Phoebe Gaston
(Department of Linguistics and Languages, McMaster University)
Arrived in Fall 2023
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. Elisabet Service
(Department of Linguistics and Languages, McMaster University)
Dr. Ranil Sonnadara
(Department of Surgery, McMaster University)
Dr. Laurel Trainer
(Department of Psychology, Neuroscience & Behaviour, McMaster University)
Arrived in Winter 2024
Dr. Lyn Turkstra
(School of Rehabilitation Science, McMaster University)

ACADEMIC COLLABORATORS
Lesya Ukrainka Volyn National University, Lutsk, Ukraine
Basque Center on Cognition Brain and Language, San Sebastián, Spain
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
Words in the World (WoW), Partnership Grant funded by the Social Sciences and Humanities Research Council of Canada (SSHRC), Canada
University of Turku (Department of Psychology and Speech-Language Pathology), Turku, Finland
Tilburg University, Tilburg, Netherlands
Xi’an Jiaotong – Liverpool University, Suzhou, China

MEMBERS
Dr. Bhanu Sharma
(Supervised by Dr. Michael Noseworthy)

AFFILIATED RESEARCHERS
Dr. Mary Amaechi
(International Visiting Research, Syntax Lab, 2023-2024)
Dr. Renan Ferreira
(International Visiting Researcher, MELD Bilingualism Lab, 2023-2024)
Dr. Mohamed Jlassi
(International Visiting Research, Syntax Lab, 2023-2025)
Dr. Daniel Schmidtke
(Research Associate, MELD Bilingualism Lab)

POSTDOCTORAL FELLOWS
Dr. Theotheime Bakunzi
(Supervised by Dr. Ranil Sonnadara)
Dr. Charles Jason Bernard
(Supervised by Dr. Ranil Sonnadara)*
Dr. Maiia Bulakh
(Supervised by Dr. Daniel Pape)
Dr. Alina Dochu
(Supervised by Dr. Ivona Kučerová)
Dr. Bhanu Sharma
(Supervised by Dr. Michael Noseworthy)

NON-ACADEMIC COLLABORATORS:
Bundled Arrows Inc., Niagara Falls, NY, United States
Onkwawenna Kentochkwa, Ohsweken, ON, Canada
Twatati Oneida Language Committee, Southwold, ON, Canada
VoxNeuro, Hamilton, ON, Canada
CBC Kids/CanChild
**DOCTORAL STUDENTS:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Supervised By</th>
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<tbody>
<tr>
<td>Felix Kpogo</td>
<td>(Supervised by Dr. Daniel Pape)</td>
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<tr>
<td>Nadia Lana</td>
<td>(Supervised by Dr. Victor Kuperman)</td>
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<tr>
<td>Yarden Levy</td>
<td>(Co-supervised by Dr. Sue Becker and Dr. Margaret McKinnon)</td>
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<td>Haiyang Liu</td>
<td>(Supervised by Dr. Alison Biggs)</td>
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<td>Braulio Lopes</td>
<td>(Supervised by Dr. Alison Biggs)</td>
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<tr>
<td>Esther Vicente Manzanedo</td>
<td>(Supervised by Dr. Elisabet Service)</td>
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<tr>
<td>Kestrel McNeill</td>
<td>(Supervised by Dr. Ranil Sonnadara)</td>
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<tr>
<td>Allison Mizzi</td>
<td>(Co-supervised by Dr. Sue Becker and Dr. Margaret McKinnon)</td>
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<tr>
<td>Cameron Nowikow</td>
<td>(Supervised by Dr. Michael Noseworthy)</td>
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<tr>
<td>Meagan Nuculaj</td>
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<td>Bre-Anna Owusu</td>
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<td>Sara Pearsell</td>
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<tr>
<td>Adam Politis</td>
<td>(Supervised by Dr. Lyn Turkstra)</td>
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<td>Frederico Prado</td>
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<tr>
<td>Ethan Samson</td>
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<td>Nicholas Simard</td>
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<td>Lyndsay Simmons</td>
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<td>Selena Singh</td>
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<td>Mahnaz Tajik</td>
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<td>Mitra Tavakkoli</td>
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<td>Chelsea Whitwell</td>
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<td>Nadia Wong</td>
<td>(Supervised by Dr. Sue Becker)</td>
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<tr>
<td>Aya Zarka</td>
<td>(Supervised by Dr. Ivona Kučerová)</td>
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<tr>
<td>Calvin Zhu</td>
<td>(Supervised by Dr. Michael Noseworthy)</td>
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*Completed Program in 2023*

**MASTER’S STUDENTS:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Supervised By</th>
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<tbody>
<tr>
<td>Konrad Grała</td>
<td>(Supervised by Dr. Michael Noseworthy)</td>
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<tr>
<td>Audrey Ho</td>
<td>(Supervised by Dr. Ivona Kučerová)</td>
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<tr>
<td>Fern Juster</td>
<td>(Supervised by Dr. Ranil Sonnadara)</td>
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<tr>
<td>Mason Kadem</td>
<td>(Supervised by Dr. Michael Noseworthy)</td>
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<tr>
<td>Monika Krizic</td>
<td>(Supervised by Dr. Daniel Pape)</td>
</tr>
<tr>
<td>Dakyung (Rachel) Lim</td>
<td>(Co-supervised by Dr. Daniel Pape and Dr. Magda Stroinska)</td>
</tr>
<tr>
<td>Gwenvyth Lu</td>
<td>(Supervised by Dr. John Connolly)</td>
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<tr>
<td>Meagan Nuculaj</td>
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<tr>
<td>Simranpreet Sandal</td>
<td>(Supervised by Dr. Daniel Pape)</td>
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<tr>
<td>Derya Sonmez</td>
<td>(Supervised by Alison Biggs)</td>
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<tr>
<td>Ethan Stollar</td>
<td>(Supervised by Dr. Ivona Kučerová)</td>
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<tr>
<td>Mahnaz Tajik</td>
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<tr>
<td>Heather Wild</td>
<td>(Supervised by Dr. Victor Kuperman)</td>
</tr>
<tr>
<td>Ziqi (Jordan) Yang</td>
<td>(Co-supervised by Dr. Elisabet Service and Dr. Daniel Pape)</td>
</tr>
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</table>

*Completed Program in 2023*
ARiEAL Research Centre
L.R. Wilson Hall, Room 4020,
McMaster University
1280 Main Street West
Hamilton, ON L8S 4K1
Canada

Email: ariearc@mcmaster.ca
Website: arireal.humanities.mcmaster.ca
X: @ARiEAL_Research
Instagram: @ariealrc

LinkedIn: @The Centre for Advanced Research in Experimental and Applied Linguistics (ARiEAL)

ARiEAL IS GRATEFUL TO OUR PARTNERS FOR THEIR FINANCIAL AND RESOURCE SUPPORT