ANNUAL REPORT 2023

ARiEAL

Advanced Research in Experimental & Applied Linguistics

MESSAGE FROM THE DIRECTOR

DR. IVONA KUČEROVÁ
ARIEAL DIRECTOR

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 ground-breaking 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 which 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:

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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.

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.

Ivona Kučerová

RESEARCH HIGHLIGHTS 2023

ARiEAL is a research centre that brings together a collaborative and interdisciplinary community of researchers ranging from undergraduate trainees to established scholars and enables them to excel in their problem-driven language science research in fundamental, experimental, and applied linguistics. Our work is grounded in principles of equity, diversity, and inclusion, and we believe in rigorous and integral scientific inquiry and the complementarity of fundamental and applied research. Highlighted in this report are the research, knowledge mobilization, outreach, professionalization, and training activities for ARiEAL and each of our laboratories for the year 2023.

BRODBECK LAB

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."

DR. CHRISTIAN BRODBECK

GRAMMATICAL THEORY GROUP

DR. ALISON BIGGS

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

In 2023, Dr. Biggs was the recipient on 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).

GASTON LAB

DR. PHOEBE GASTON

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.

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IMAGING PHYSICS & ENGINEERING, IMAGING RESEARCH CENTER

DR. MICHAEL NOSEWORTHY

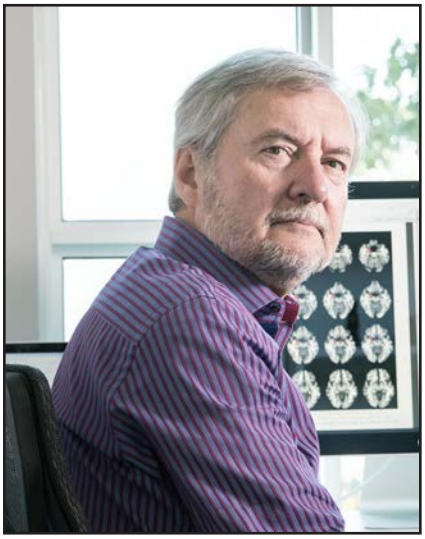
Dr. Michael Noseworthy is a professor in Electrical and Computer Engineering and Associate Chair (Research), Department of Medical Imaging. Also, he is the director of Medical Imaging Physics and Engineering at the Imaging Research Centre at St. Joseph's Healthcare, Hamilton. He has also played a major 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!

LANGUAGE, MEMORY & BRAIN LAB

The Language, Memory, and Brain (LMB) Lab is co-directed by **Drs. John Connolly** and **Elisabet Service**. Dr. Service investigates the cognitive building blocks 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



DR. JOHN CONNOLLY

DR. ELISABET SERVICE

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 BILINGUIALISM 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.

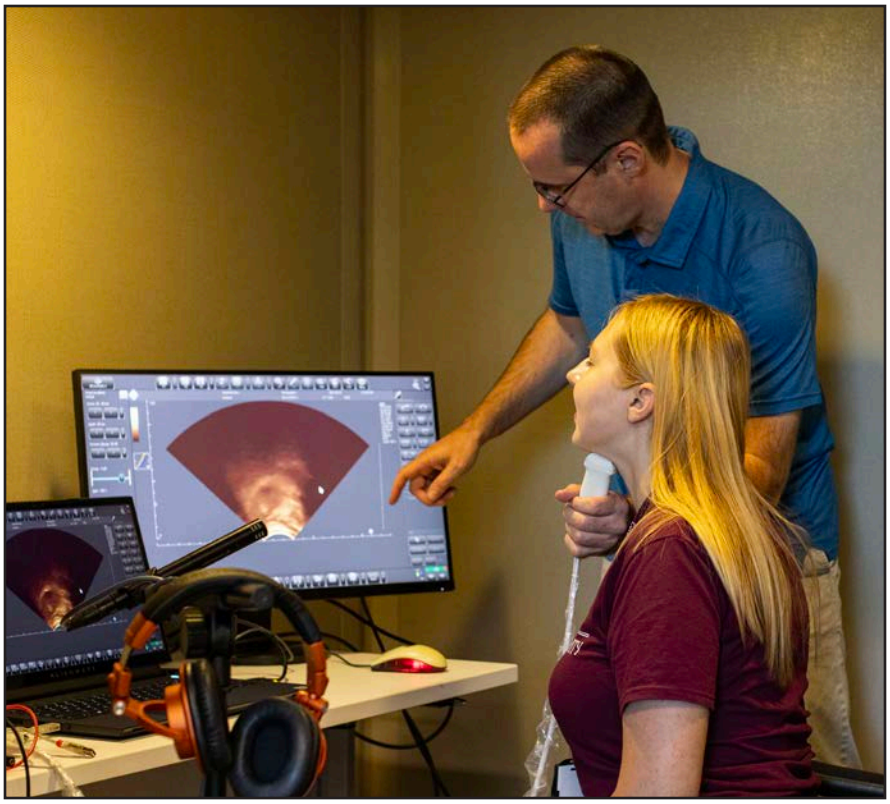
DR. ANNA MORO

PHONETICS LAB

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 [mot], the Montreal-Ottawa-Toronto-Hamilton Phonology/Phonetics workshop .

DR. DANIEL PAPE



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NEUROTECHNOLOGY AND NEUROPLASTICITY LAB

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!

DR. SUE BECKER

READING LAB

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!

DR. VICTOR KUPERMAN

SONNADARA LAB

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!

DR. RANIL SONNADARA

SYNTAX LAB

DR. IVONA KUČEROVÁ

Dr. Ivona Kučerová, director of the Syntax Lab and ARiEAL, investigates syntactic structures, with a specific focus on the syntax-semantics interface. More specifically, the lab is investigating 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 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!

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TURKSTRA LAB

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

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.

DR. LYN TURKSTRA

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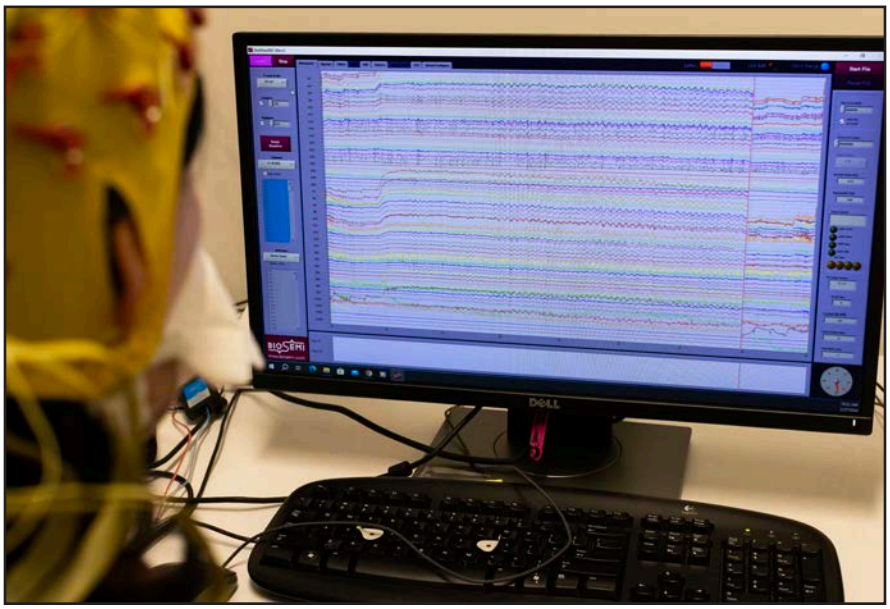
BY THE NUMBERS

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.



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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)

Sohlberg, M.M., Hamilton, J. & **Turkstra, L.S.** (2023). Transforming Cognitive Rehabilitation. NY: Guilford Press. 336p.

BOOK CHAPTERS (1)

Zhu, C., Doyle, T. & **Noseworthy M.D.** (2023). Addressing dataset shift for trustworthy deep learning Diagnostic ultrasound decision support. In Gavrilova, M., Tan, C.J. Kenneth, Coates, M., Hu., Y., Leung, H., Mohammadi, A., Plataniotis, K.N. & de Oliveira, H.R. (Eds.). Transactions on Computational Science XL (pp. 110-128). Berlin: Springer.

JOURNAL ARTICLES (47)

Anderson, V., Darling, S., Hearps, S., Darby, D., Dooley, J., McDonald, S., **Turkstra L.S.**, et al. (2023). Deep phenotyping of socio-emotional skills in children with typical development, neurodevelopmental disorders, and mental health conditions: Evidence from the PEERS. PLOS One, 18(10), 1-17.

Battershill, K. & **Kuperman, V.** (2023). A bird's eye view of civic engagement and its facets: Canonical correlation analysis across 34 countries. Journal of Civic Society, 19 (4), 437-463.

JOURNAL ARTICLES (CONT)

Battershill, K. & **Kuperman, V.** (2023). Linguist is as linguist does: A comparative study on the employment and income of graduates from linguistics programs in Canada. Language, 99(4), 191-209.

Bayley, M.T., Janzen, S., Harnett, A., Bragge, P., Togher, L., Kua, A., Patsakos, E., **Turkstra, L.S.**, et al. (2023). INCOG 2.0 guidelines for cognitive rehabilitation following traumatic brain injury: What's changed from 2014 to now? The Journal of Head Trauma Rehabilitation, 38(1), 1-6.

Bernard, J., **Sonnadara, R.**, Saraco, A.N., Mitchell, J.P., Bak, A.B., Bayer, I. & Wainman, B. C. (2023). Automated grading of anatomical objective structured practical examinations using decision trees: An artificial intelligence approach. Anatomical Sciences Education, 1-12.

Brodbeck, C., Das, P., Gillis, M., Kulasingham, J.P., Bhattasali, S., Gaston, P., Resnik, P. & Simon, J.Z. (2023). Eelbrain, a Python toolkit for time-continuous analysis with temporal response functions. eLife 12, 1-30.

Brodbeck, C., Kandylaki, K.D. & Scharenborg, O. (2023). Neural representa- tions of non-native speech reflect proficiency and interference from native language knowledge. Journal of Neuroscience, 44(1), 1-14.

Chaposhloo, M., Nicholson, A.A., **Becker, S.**, McKinnon, M.C., Lanius, R. & Shaw, S. (2023). Altered Resting-State functional connectivity in the anterior and posterior hippocampus in Post-traumatic stress disorder: The central role of the anterior hippocampus. NeuroImage: Clinical, 38, 1-18.

Clough, S., Tanguay, A.F.N., Mutlu, B., **Turkstra, L.S.** & Duff, M.C. (2023). How do individuals with traumatic brain injury interpret emoji? Similarities and differences in perceived valence, arousal, and emotion representation. Brain Injury, 37(7), 596-610.

Coskun, M., **Kuperman, V.** & Rueckl, J. (2023). Long-lag repetition priming in natural text reading: No evidence for morphological effects. Mental Lexicon, 18(1), 1-40.

Danielli, E., Simard, N., Dematteo, C., Kumbhare, D., Ulmer, S. & **Noseworthy M.D.** (2023). A review of brain regions and associated post-concussion symptoms. Frontiers in Neurology, 14, 1-25.

Doughty, M., Danielli, E., Boshra, R., Ruiter, K.I., Minuzzi, L., **Connolly, J.F.** & **Noseworthy, M.D.** (2023). Years of play alter MRI measures of brain health in former Canadian Football League athletes. Journal of Concussion, 7, 1-17.

Gaston, P., Brodbeck, C., Phillips, C. & Lau, E. (2023). Auditory word com- prehension is less incremental in isolated words. Neurobiology of Language, 4(1), 29-52.

Herrera, C., Whittle, N., Leek, M.R., **Brodbeck, C.**, Lee, G., Barcenas, C., Barnes, S., Holshouser, B., Yi, A. & Venezia, J.H. (2023). Cortical networks for recognition of speech with simultaneous talkers. Hearing Research, 437, 1-18.

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Kyröläinen, A.-J. & **Kuperman, V.** (2023). Emotional state of older adults during the COVID-19 pandemic: Insights from the Cognitive and Social Well-Being (CoSoWELL) corpus. Experimental Aging Research, 0(0), 1-24.

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JOURNAL ARTICLES (CONT)

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Passaretti, B., **Turkstra. L.S.**, Gallagher, T., Jiang, A., Cahill, P. & Campbell, W. (2023). Reporting of classroom-based morphological awareness instruction and intervention for kindergarten to grade 3 students in the literature: A scoping review. Language, Speech, and Hearing Services in Schools, 54(2), 648-69.

Pearsell, S. & **Pape, D.** (2023). The effects of different levels of amplitude variation on the perceived dominance of a speaker. LACUS Forum, 49.

Pearsell, S. & **Pape, D.** (2023). The effects of different voice qualities on the perceived personality of a speaker. Frontiers in Communication, 7, 1-20.

Radadia, N., Friedlander, Y., Priel, E., Konyer, N.B., Huang, C., Jamal, M., Farncombe, T., Marriott, C., Finley, C., Agzarian, J., Dolovich, M., **Noseworthy, M.D.**, Nair, P., Shargall, Y. & Svenningsen, S. (2023). Comparison of ventilation defects quantified by Technegas SPECT and hyperpolarized 129Xe MRI. Frontiers in Physiology, 14, 1-11.

Schmidtke, D., Rahmanian, S. & **Moro, A. L.** (2023). Tracking reading development in an English language university-level bridging program: evidence from eye-movements during passage reading. Bilingualism: Language and Cognition, 26(2), 356-370.

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Turkstra, L. S., Salanki, K., MacIntyre, E., Kim, N., Jin, J., Sprague, S. [...] Bhandari, M. (2023). What is the prevalence of intimate partner violence and traumatic brain injury in Fracture Clinic patients? Clinical Orthopaedics and Related Research, 481, 132-142.

Weigel, C., **Pape, D.** & Stroińska M. (2023). Linguistic analysis and case studies of errors: Comparison of speech recognition systems for academic use for deaf and hard of hearing students. LACUS Forum, 47.

Xie, Z., **Brodbeck, C.** & Chandrasekaran, B. (2023). Cortical tracking of continuous speech under bimodal divided attention. Neurobiology of Language, 4(2), 318-343.

Xu, H., Owens, M.M., Farncombe, T., **Noseworthy, M.D.** & MacKillop, J. (2023). Molecular brain differences and cannabis involvement: A systematic review of positron emission tomography studies. Journal of Psychiatric Research, 162, 44–56.

Zasiekina, L., Zasiekin, S. & **Kuperman, V.** (2023). Post-traumatic stress disorder and moral injury among Ukrainian civilians during the ongoing war. Journal of Community Health, 48(5), 784–792.

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CONFERENCE PROCEEDINGS & ABSTRACTS (19)

Amador-Tejada, A., McGillivray, J.E., de Bruin, H. & **Noseworthy, M.D.** (2023). 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 Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S210–S211, P173.

Amador-Tejada, A. & **Noseworthy, M.D.** (2023). A multimodal approach to understand skeletal muscle water dynamics using magnetization transfer and blood oxygen level dependent (BOLD) signal. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S164–S165, P131.

Amador-Tejada, A. & **Noseworthy, M.D.** (2023). 1H-MRS human skeletal muscle quantification: a repeatability analysis. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 4211.

Danielli, E., Sharma, B., Nowikow, C.E. & **Noseworthy, M.D.** (2023). Abnormal spontaneous brain fluctuations present in retired football players. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 457.

Danielli, E., Simard, N., Kumbhare, D. & **Noseworthy, M.D.** (2023). Resting state functional MRI shows post-concussion brain abnormalities persist past symptom resolution: preliminary findings. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S304–S305, P255.

Hu, Y., Lim, H., Johnson, H.L., O'Shaughnessy, J.M., Kakonge, L., **Turkstra, L.S.,** Duff, M.C., Toma, C. & Mutlu B. (2023). Investigating day-to-day experiences with conversational agents by users with traumatic brain injury. ASSETS '23: Proceedings of the 25th International ACM SIGACCESS Conference on Computers and Accessibility, 54, 1-15.

Lim, H., Kakonge, L., Hu, Y., **Turkstra, L.S.,** Duff, M., Toma, C., et al. (2023). So, I can feel normal: Participatory design for accessible social media sites for individuals with traumatic brain injury. CHI '23: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems, 335, 1-19.

Nowikow, C.E., Polak, P. & **Noseworthy M.D.** (2023). Time-of-day analysis of cerebral sodium TSC maps. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 1264.

Nowikow, C., Sharma, B. & **Noseworthy, M.D.** (2023). The lack of B0 maps in rs-fMRI databases: A big problem or no big deal? European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S212–S213, P174.

Pauli Y. & **Noseworthy M.D.** (2023). Detection of Alzheimer's disease in diffusion tensor imaging data using mahalanobis distance-based outlier detection. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S164–S165, P131.

Pearsell, S & **Pape, D.** (2023). The effect of different levels of amplitude variation on perceived speaker dominance. Proceedings of the International Conference of Phonetic Sciences (ICPhS), 206-210.

Radadia, N., Friedlander, Y., Konyer, N.B., Jamal, M., Huang, C., Farncombe, T., Marriott, C., Dolovich, M.B., Nair, P., Shargall, Y., Finley, C., Agzarian, J., **Noseworthy, M.D.** & Svenningsen, S. (2023). Comparison of ventilation defects quantified by Technegas V-SPECT and hyperpolarized 129Xe MRI. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 4672.

Repiso-Puigdelliura, G. & **Pape, D.** (2023). Examining the effects of stress on vowel production in heritage vs. monolingual Spanish school-aged child speakers. Proceedings of the International Conference of Phonetic Sciences (ICPhS), 2916-2920.

Santos-Dıaz, A. & **Noseworthy, M.D.** (2023). Assessment of reconstruction accuracy for undersampled 31P-MRS data using a low-rank Hankel Matrix completion approach. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S189–S190, P153.

Simard, N.M., Fernback, A., Konyer, N., Kerins, F. & **Noseworthy, M.D.** (2023). Assessing measurement consistency of a diffusion tensor imaging (DTI) quality control (QC) phantom. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S164–S165, P131.

Simard, N.M., **Noseworthy, M.D.**, Kumbhare, D.A., Ulmer, S. & Danielli, E. (2023). Comparing self- reporting concussion assessments with an objective diffusion tensor imaging (DTI) and resting state MRI (rsMRI) based measure. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 463.

Tavakkoli, M., Svenningsen, S., Friedlander, Y., Konyer, N., Nair, P. & **Noseworthy, M.D.** (2023). The effect of variable compressed sense (CS) under-sampling patterns in hyperpolarized Xenon (129Xe) diffusion-weighted MRI. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 4497.

Tavakkoli, M., Svenningsen, S., Konyer, N., Nair, P. & **Noseworthy, M.D.** (2023). Bayesian optimization for batch tuning in deep learning-based 129Xe lung MRI reconstruction. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S190–S191, P154.

Zhu, C., Doyle, T. & **Noseworthy, M.D.** (2023). Generative pre-training with masked image modelling of k-space for MRI reconstruction. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S320–S321, P270

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.

Amador-Tejada, A. & **Noseworthy, M.D.** (2023, June). 1H-MRS human skeletal muscle quantification: a repeatability analysis. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada. (ePoster).

Amador-Tejada, A. & **Noseworthy, M.D.** (2023, October). A multimodal approach to understand skeletal muscle water dynamics using magnetization transfer and blood oxygen level dependent (BOLD) signal. European Society for Magnetic Resonance in Medicine and 2023 Online 39th Annual Scientific Meeting, Basel, Switzerland. (Poster).

Biggs, A. (2023, March). A new look at the interpretation and structure of Stative Passives. Invited talk at the University of Toronto, Toronto, Canada.

Biggs, A. & Embick, D. (2023, June). On the structure, interpretation, and distribution of English stative passive participles. Congress 2023 of the Humanity and Social Sciences. Canadian Linguistic Association, Toronto, Canada.

Biggs, A. & Embick, D. (2023, September). On the interpretation and structure of English stative passives. Conference of the Linguistics Association of Great Britain, Cambridge, United Kingdom.

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

Brodbeck, C. (2023). Eelbrain for MEG/EEG: Mass-univariate statistics. Invited talk at the National Institutes of Health Club MEG.

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

Brodbeck, C. (2023). Neural mechanisms of Speech processing in continuous speech. Invited talk at McMaster University, Hamilton, Ontario.

Brodbeck, C. (2023). Neural mechanisms of Speech processing in continuous speech. Invited talk at CUNY Graduate Center, New York, United States.

Commanda, K., **Kučerová, I.** & Owennatakha, L.P. (2023, November) Tehatiwennathe'tanyons. They shine light on the languages. McMaster Indigenous Research Institute (MIRI) Indigenous Research Day, McMaster University, Hamilton, Canada.

Crinnion, A.M. & **Brodbeck, C.** (2023, October). Examining phoneme, syllable, and word level representations in continuous speech processing. 15th annual meeting of the Society for the Neurobiology of Language, Marseilles, France. (Poster).

Crinnion, A.M., Magnuson, J.M., Myers, E. & **Gaston, P.** (2023, November). Predictability effects on auditory word recognition in a novel priming paradigm. 64th Annual Meeting of the Psychonomic Society, San Francisco, United States.

Dakyung, L. & **Pape, D.** (2023, July). Perception of child-produced polish sibilants: A comparison of native English and Polish heritage speakers. 49th conference of the Linguistic Association of Canada and United States, University of Toledo, Toledo, USA.

Danielli, E., Sharma, B., Nowikow, C.E. & **Noseworthy, M.D.** (2023, June). Abnormal spontaneous brain fluctuations present in retired football players. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada.

Ilicic, A.M., McKinnon, V.E., Colizza, L., Wismer, T. & **Sonnadara, R. R.** (2023, October). A checklist for exploring competence committee effectiveness at the institutional level. The International Conference of Residency Education (ICRE), virtual.

Karunathilake, D., **Brodbeck, C.**, Bhattasali, S., Resnik, P. & Simon, J.Z. (2023, February). Progression of acoustic, phonemic, lexical and sentential neural features emerge during speech listening. Association of Research in Otolaryngology, Orlando, United States.

Kleinman, D., Campanelli, L., Lee, B., Van Dyke, J., **Brodbeck, C.** & Landi, N. (2023, October). Greater reliance on sentence context during naturalistic listening predicts larger reading gains over two years. 15th annual meeting of the Society for the Neurobiology of Language, Marseilles, France. (Poster).

Krizic M. & **Pape D.** (2023, March). Prosodic speech production and perception differences: Comparing populations with varying levels of autistic traits. Montreal-Ottawa-Toronto-Hamilton Phonology/Phonetics Workshop, McMaster University, Hamilton, Canada.

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

Kučerová, I. (2023, January). Syntactic puzzles: phi-Agree. The NYI Global Institute of Cultural, Cognitive, and Linguistic Studies, V-NYI #6, virtual.

Kučerová, I. (2023, October). The syntax of gender features: The morphologist's guide to feature-bundling traps. 7th Montreal-Ottawa-Toronto Morphology Meeting, University of Toronto, Toronto, Canada.

PRESENTATIONS (CONT)

Kučerová, I. & Munn, A. (2023, April). Agree only once! Evidence from φ-agreement. 32nd Colloquium on Generative Grammar, University of the Basque Country, Vitoria-Gasteiz, Spain.

Kučerová, I. & Munn, A. (2023, May). Beyond φ-features: Are we there yet? Agree reconsidered. 41st West Coast Conference on Formal Linguistics, University of California, Santa Cruz, United States.

Middaugh-Cifuentes M. & **Pape D.** (2023, March). What's in a name? Examining the mispronunciation of proper names in academic settings. 2023 [moth]: Montreal-Ottawa-Toronto-Hamilton Phonology/ Phonetics Workshop, McMaster University, Hamilton, Canada.

Noseworthy, M.D. (2023, February). Advanced brain MRI methods to assess concussion. Invited Talk at Brock University, St. Catharines, Canada.

Noseworthy, M.D. (2023, June). Noninvasive assessment of micro-vasculature using magnetic resonance imaging (MRI): Applications in cancer and brain disorders. Invited talk at the University of Gothenburg, Göteborg, Sweden.

Nowikow, C.E., Polak, P. & **Noseworthy M.D.** (2023, June). Time-of-day analysis of cerebral sodium TSC maps. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada.

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.

Owusu, B. & **Service, E.** (2023, July). Priming with musical rhythm enhances verbal working memory. Annual Meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science, Guelph, Canada.

Owusu, B. & **Service, E.** (2023, November). Let the music play: The beneficial effects of musical rhythm on verbal working memory. 64th Annual Meeting of the Psychonomic Society, San Francisco, United States. (Poster).

Pape, D. (2023, May). Perceptual stability of sibilants undergoing acoustic variation: Interplay between acoustic processing versus influences of articulatory and/or motor patterns. Hanyang International Symposium on Phonetics and Cognitive Sciences of Languages, Hanyang University, Seoul, South Korea.

Pape, D. & Stroinska, M. (2023, June). Court interpretation: post-pandemic traps and pitfalls in Online Courtrooms. The Canadian Symposium of Language and Law, York University, Toronto, Canada.

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.

Radadia, N., Friedlander, Y., Konyer, N.B., Jamal, M., Huang, C., Farncombe, T., Marriott, C., Dolovich, M.B., Nair, P., Shargall, Y., Finley, C., Agzarian, J., **Noseworthy, M.D.**, & Svenningsen, S. (2023, June). Comparison of ventilation defects quantified by Technegas V-SPECT and hyperpolarized 129Xe MRI. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada. (ePoster).

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.

Service, E., Ahmad, F. & Yau, A. (2023, November). Short-Term Memory in Language Acquisition: Phonology or Temporal Structure? 64th Annual Meeting of the Psychonomic Society, San Francisco, United States.

Simard, N.M., Fernback, A., Konyer, N., Kerins, F. & **Noseworthy, M.D.** (2023, October). Assessing measurement consistency of a diffusion tensor imaging (DTI) quality control (QC) phantom. European Society for Magnetic Resonance in Medicine and 2023 Online 39th Annual Scientific Meeting, Basel, Switzerland.

Simard, N.M., **Noseworthy, M.D.**, Kumbhare, D.A., Ulmer, S. & Danielli, E. (2023, June). Comparing self- reporting concussion assessments with an objective diffusion tensor imaging (DTI) and resting state MRI (rsMRI) based measure. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada. (Power Pitch).

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.

Tavakkoli, M., Svenningsen, S., Friedlander, Y., Konyer, N., Nair, P. & **Noseworthy, M.D.** (2023, June). The effect of variable compressed sense (CS) under-sampling patterns in hyperpolarized Xenon (129Xe) diffusion-weighted MRI. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada. (ePoster).

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.

Coon, J. (PI), Béjar, S., Brant, W. Decaire, R., **Kučerová, I.** & Ovale, L.A. Understanding Kanien'kéha verbs: Linguistic research and language revitalization. SSHRC Insight Development Grant, $70,700, 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.

Dagenais, M. ARiEAL Research Magazine, Vol. 1. 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. The language of trauma in testimonies of the Russia-Ukraine war. McMaster International Initiatives Microfund, $5000, 2023.

Kuperman, V. The language of trauma in testimonies of the Russia-Ukraine war. New Frontiers Research Foundation (NFRF) Exploration Grant, $248,587, 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. Multimodal noninvasive assessment of healthy neuromuscular activity. Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant, $405,000, 2023-28.

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

Punthakee, Z., Morrison, K.M., Alamri, B., Gerstein, H., Konyer, N., **Noseworthy, M.D.**, Steinberg, G., Thabane, L. & Wharton S. Mechanisms of weight loss due to dual GIP GLP-1 receptor agonism with tirzepatide compared to semaglutide. Canadian Institutes of Health Research (CIHR) Project Grant, $648,397, 2023-28.

Shah, Y. S (PI) & **Brodbeck, C.** Neurocognitive Mechanisms of Sentence Production Impairment in Aphasia. National Institutes of Health, National Institute of Deafness and Communication Disorders RO1, $3,092,049, 2023-28.

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.

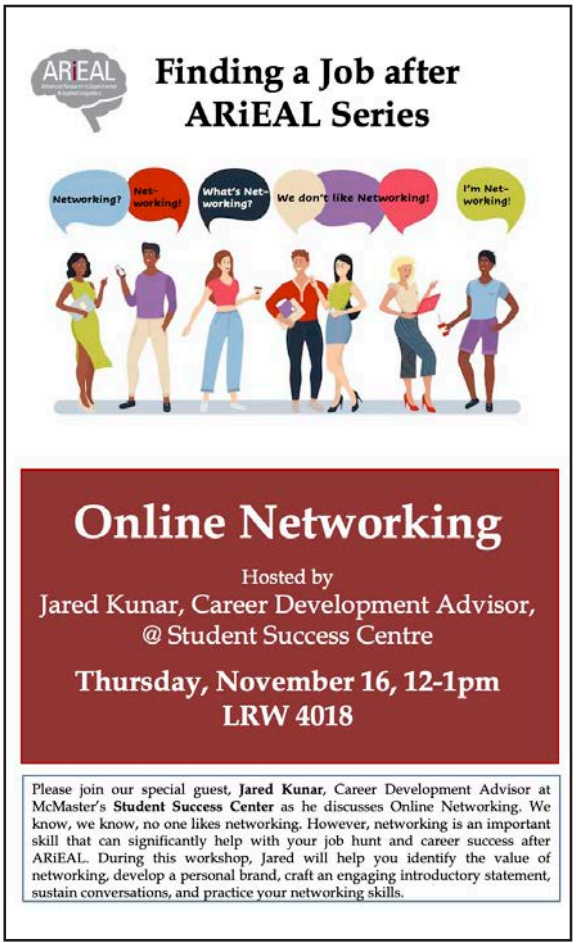
As a core research platform, we are able to provide a full-cycle research/knowledge translation service program – we take problems from "real world" settings (classrooms, our community, and clinical settings, to name a few), develop and implement a multi-methods research and experimental program to assess 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.

SPEAKER & LEARNING SERIES

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 Zasiekina** 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.



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.

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.

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.

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PUBLICATIONS:

Amador-Tejada, A., McGillivray, J.E., de Bruin, H. & Noseworthy, M.D. (2023). 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 Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S210–S211, P173.

Amador-Tejada, A. & Noseworthy, M.D. (2023). A multimodal approach to understand skeletal muscle water dynamics using magnetization transfer and blood oxygen level dependent (BOLD) signal. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S164–S165, P131.

Amador-Tejada, A. & Noseworthy, M.D. (2023). 1H-MRS human skeletal muscle quantification: a repeatability analysis. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 4211.

Amaechi, M. (2023). Wh-question formation in Lokaa. Journal of African Languages and Literatures 4, 1-22.

Amaechi, M. & Nwosu, F. C. (2023). Body-part terms in the grammar of Igbo. Southern African Linguistics and Applied Language Studies, 41(2), 171-90.

Benjamin, S. & **Schmidtke, D.** (2023). Conceptual combination during novel and existing compound word reading in context: a self-paced reading study Memory & cognition, 51(2), 1170-1197.

Danielli, E., Sharma, B., **Nowikow, C.E.** & Noseworthy, M.D. (2023). Abnormal spontaneous brain fluctuations present in retired football players. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 457.

Danielli, E., **Simard, N.**, Dematteo, C., Kumbhare, D., Ulmer, S. & Noseworthy MD. (2023). A review of brain regions and associated post-concussion symptoms. Frontiers in Neurology, 14, 1-25.

Dakyung, L. (2023). Perception of Child-produced Polish sibilants: A comparison of native English speakers and Polish heritage speakers. ARiEAL Research Magazine, 1, 1-18.

Dhaliwal, H. (2023) Environmental Pollution & Reading. Psynapse: McMaster's Undergraduate PNB Journal.

Hu, Y., Lim, H., Johnson, H.L., O'Shaughnessy, J.M., **Kakonge, L.**, Turkstra, L.S., Duff, M.C., Toma, C. & Mutlu B. (2023). Investigating day-to-day experiences with conversational agents by users with traumatic brain injury. ASSETS '23: Proceedings of the 25th International ACM SIGACCESS Conference on Computers and Accessibility, 54, 1-15.

PHOTO CREDIT: COLIN CZERNEDA C/O MCMASTERUNIVERSITY

Lana, N. & Kuperman, V. (2023). Learning concrete and abstract novel words in emotional contexts: Evidence from incidental vocabulary learning. Language Development and Learning, 20(2), 158-173.

Lim, H., **Kakonge, L.**, Hu, Y., **Turkstra, L.S.**, Duff, M., Toma, C., et al. (2023). So, I can feel normal: Participatory design for accessible social media sites for individuals with traumatic brain injury. CHI '23: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems, 335, 1-19.

Nowikow, C.E., Polak, P. & Noseworthy M.D. (2023). Time-of-day analysis of cerebral sodium TSC maps. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 1264.

Nowikow, C.E., Sharma, B. & Noseworthy, M.D. (2023). The lack of B0 maps in rs-fMRI databases: A big problem or no big deal? European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S212–S213, P174.

Pearsell, S. & Pape, D. (2023). The effects of different levels of amplitude variation on the perceived dominance of a speaker. LACUS Forum, 49.

Pearsell, S. & Pape, D. (2023). The effect of different levels of amplitude variation on perceived speaker dominance. Proceedings of the International Conference of Phonetic Sciences (ICPhS), 206-210.

Pearsell, S. & Pape, D. (2023). The effects of different voice qualities on the perceived personality of a speaker. Frontiers in Communication, 7, 1-20.

Repiso-Puigdelliura, G. & Pape, D. (2023). Examining the effects of stress on vowel production in heritage vs. monolingual Spanish school-aged child speakers. Proceedings of the International Conference of Phonetic Sciences (ICPhS), 2916-2920.

Schmidtke, D., Rahmanian, S. & Moro, A. L. (2023). Tracking reading development in an English language university-level bridging program: evidence from eye-movements during passage reading. Bilingualism: Language and Cognition, 26(2), 356-370.

Simard, N.M., Fernback, A., Konyer, N., Kerins, F. & Noseworthy, M.D. (2023). Assessing measurement consistency of a diffusion tensor imaging (DTI) quality control (QC) phantom. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S164–S165, P131.

Simard, N.M., Noseworthy, M.D., Kumbhare, D.A., Ulmer, S. & Danielli, E. (2023). Comparing self- reporting concussion assessments with an objective diffusion tensor imaging (DTI) and resting state MRI (rsMRI) based measure. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 463.

Simmons, L., Feng, L., Fatemi-Ardekani, A. & Noseworthy, M.D. (2023). Breast cancer calcifications and implications in medical imaging. Critical Reviews in Biomedical Engineering, 51(5), 43-62.

Singh, S., Becker, S., Trappenberg, T. & Nunes, A. (2023). Granule cells perform frequency-dependent pattern separation in a computational model of the dentate gyrus. Hippocampus, 34(1), 14-28.

Sharma, B., **Nowikow, C.E.**, DeMatteo, C., Noseworthy, M.D. & Timmons, B.W. (2023). Sex-specific differences in resting-state functional brain activity in pediatric concussion. Scientific Reports, 13, 1-10.

Tavakkoli, M., Svenningsen, S., Friedlander, Y., Konyer, N., Nair, P. & Noseworthy, M.D. (2023). The effect of variable compressed sense (CS) under-sampling patterns in hyperpolarized Xenon (129Xe) diffusion-weighted MRI. Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM), 32, 4497.

Tavakkoli, M., Svenningsen, S., Konyer, N., Nair, P. & Noseworthy, M.D. (2023). Bayesian optimization for batch tuning in deep learning-based 129Xe lung MRI reconstruction. European Society for Magnetic Resonance in Medicine and Biology (ESMRMB). Magnetic Resonance Materials in Physics, Biology, and Medicine. Book of Abstracts ESMRMB 2023 Online 39th Annual Scientific Meeting 4-7 October 2023, 36, S190–S191, P154.

Yau, A., Whitwell, C., Ahmad, F., Bode-Akinboye, E., Utomi, N. & Service, E. (2023). Individual differences in rhythmical abilities and short-term memory for language material. ARiEAL Research Magazine, 1, 38. (poster)

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.

Amador-Tejada, A. & Noseworthy, M.D. (2023, June). 1H-MRS human skeletal muscle quantification: a repeatability analysis. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada. (ePoster).

Amador-Tejada, A. & Noseworthy, M.D. (2023, October). A multimodal approach to Understand skeletal muscle water dynamics using magnetization transfer and blood oxygen level dependent (BOLD) signal. European Society for Magnetic Resonance in Medicine and 2023 Online 39th Annual Scientific Meeting, Basel, Switzerland. (Poster).

Amaechi, M., Mucha, A., Whibley, F. & Uegaki, W. (2023, September). Future and the composition of modal meaning: The view from Igbo. Sinn und Bedeutung 28, Ruhr University Bochum, Bochum, Germany.

Commanda, K., Kučerová, I. & Owennatakha, L.P. (2023, November). Tehatiwennathe'tanyons. They shine light on the languages. MIRI Indigenous Research Day, McMaster University, Hamilton, Canada.

Dakyung, L. & Pape D. (2023, July). Perception of child-produced Polish sibilants: A comparison of native English and Polish heritage speakers. 49th conference of the Linguistic Association of Canada and United States, University of Toledo, Toledo, USA.

Danielli, E., Sharma, B., **Nowikow, C.E.** & Noseworthy, M.D. (2023, June). Abnormal spontaneous brain fluctuations present in retired football players. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada.

Krizic M. & Pape D. (2023, March). Prosodic speech production and perception difference: Comparing populations with varying levels of autistic traits. 2023 [moth]: Montreal-Ottawa-Toronto-Hamilton Phonology/Phonetics Workshop, McMaster University, Hamilton, Canada.

Middaugh-Cifuentes M. & Pape D. (2023, March). What's in a name? Examining the mispronunciation of proper names in academic settings. 2023 [moth]: Montreal-Ottawa-Toronto-Hamilton Phonology/Phonetics Workshop, McMaster University, Hamilton, Canada.

Nowikow, C.E., Polak, P. & Noseworthy M.D. (2023, June). Time-of-day analysis of cerebral sodium TSC maps. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada.

Nowikow, C.E., 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.

Owusu, B. & Service, E. (2023, July), Priming with musical rhythm enhances verbal working memory. Annual Meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science, Guelph, Canada.

Owusu, B. & Service, E. (2023, November). Let the music play: The beneficial effects of musical rhythm on verbal working memory. 64th Annual Meeting of the Psychonomic Society, San Francisco, United States. (Poster).

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.

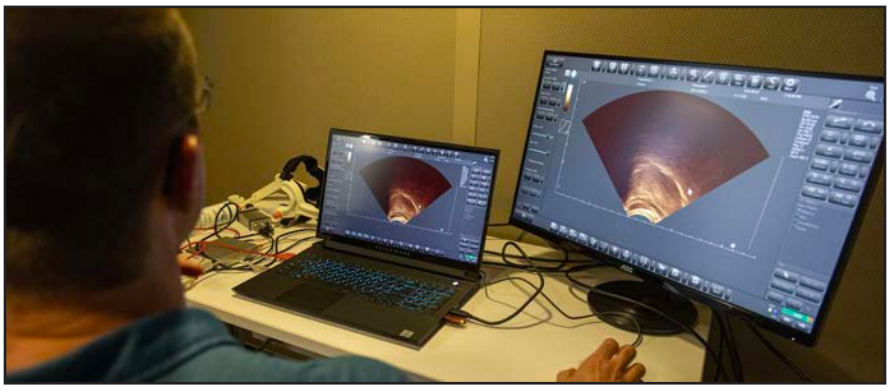
Repiso-Puigdelliura, G. & Pape, D. (2023, August). Examining the effects of stress on vowel production in heritage vs. monolingual Spanish school-aged child speakers. 20th International Congress of Phonetic Sciences (ICPhS), Prague, Czech Republic.

Service, E., **Ahmad, F.** & **Yau, A.** (2023, November) Short-term memory in language acquisition: Phonology or temporal structure? 64th Annual Meeting of the Psychonomic Society,
San Francisco, United States.

Simard, N.M., Fernback, A., Konyer, N., Kerins, F. & Noseworthy, M.D. (2023, October). Assessing measurement consistency of a diffusion tensor imaging (DTI) quality control (QC) phantom. European Society for Magnetic Resonance in Medicine and 2023 Online 39th Annual Scientific Meeting, Basel, Switzerland.

Simard, N.M., Noseworthy, M.D., Kumbhare, D.A., Ulmer, S. & Danielli, E. (2023, June). Comparing self- reporting concussion assessments with an objective diffusion tensor imaging (DTI) and resting state MRI (rsMRI) based measure. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada. (Power Pitch).

Tavakkoli, M., Svenningsen, S., Friedlander, Y., Konyer, N., Nair, P. & Noseworthy, M.D. (2023, June). The effect of variable compressed sense (CS) under-sampling patterns in hyperpolarized Xenon (129Xe) diffusion-weighted MRI. Annual Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM), Toronto, Canada. (ePoster).



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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

BRIANNA GRISKA-MACPHEE

FIZA AHMAD

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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 Trainor
(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

NON-ACADEMIC COLLABORATORS:

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

Onkwawenna Kentyohkwa,
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Twatati Oneida Language Committee, Southwold, ON, Canada

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***Completed Program in 2023**

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