Mary Alex Kelly - Curriculum Vitae - April 10, 2023

1. Personal Information

a. Name: Mary Alex Kelly

b. Pronouns: she / they

c. Mailing address:
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e. Citizenship: Canadian

2. Education

a. Doctor of Philosophy: Institute of Cognitive Science, Carleton University. Sept. 2010 - Sept. 8th, 2016 (completed). *The memory tesseract: Developing a unified framework for modelling memory and cognition.* Supervised by Dr. Robert L. West.

b. Master of Science: School of Computing, Queen's University at Kingston. Sept. 2008 - August 6th, 2010 (completed). *Advancing the theory and utility of holographic reduced representations.* Supervised by Dr. Dorothea Blostein and Dr. D. J. K. Mewhort.

c. Bachelor of Computing (Honours): Specialization: Cognitive Science. School of Computing, Queen's University at Kingston. Sept. 2004 - June 3rd, 2008 (completed). *A review of computational models of word recognition and pronunciation.* Honour's thesis supervised by Dr. Brian Butler. Graduated with distinction.

3. Academic Positions

a. Assistant Professor: Carleton University, Cognitive Science. Since July 2021.

b. Faculty Associate: Bucknell University, Computer Science. June 2021-May 2022.

c. Assistant Professor: Bucknell University, Computer Science. August 2020-May 2021.

d. Researcher: The Pennsylvania State University, College of Information Sciences and Technology. Jan. 2017 to July 2020. Supervised by Dr. David Reitter. Funded by a grant from the NSF and a fellowship from NSERC (see *Research Grants Received*).

e. Contract Instructor and Teaching Assistant: Carleton University, Departments of Cognitive Science, Psychology, and Philosophy, 2010-2015.

f. Research and Teaching Assistant: Queen's University, School of Computing, 2008-2010.

4. Honours Received

a. Nominee for Senate Medal for Outstanding Academic Achievement (Doctoral), Carleton University, 2016.

b. Five Ontario Graduate Scholarships, for 2015-2016, 2014-2015, 2013-2014, 2012-2013 and 2011-2012, each for $15 000 CAD.

c. Departmental Scholarship, Institute of Cognitive Science, Carleton University, 2010-2014.

d. Entrance Scholarship, Institute of Cognitive Science, Carleton University, 2010.

e. R. Samuel MacLaughlin Fellowship, Queen's University, 2008.

f. Natural Sciences & Engineering Research Council Undergraduate Student Research Award, 2008.

g. Medal in Cognitive Science, School of Computing, Queen's University, 2008.

h. Dean's Honour List, Queen's University, 2005-2008.

i. Dean's Entrance Scholarship in Computing, Queen's University, 2004.

5. Research Interests

I am a cognitive scientist with a background in machine learning, cognitive psychology, psycholinguistics, and philosophy of mind. My research has two goals: (1) to advance the scientific understanding of the basic cognitive functions that underpin human learning, knowledge, and language acquisition, and (2) to develop biologically-inspired machine learning systems capable of achieving expert performance on arbitrary tasks through learning.

6. Publications

a. Articles published in refereed journals

i. **Kelly, M. A.**, Arora, N., West R. L., & Reitter, D. (2020). Holographic Declarative Memory: Distributional semantics as the architecture of memory. *Cognitive Science, 44*(11), e12904. doi: 10.1111/cogs.12904

ii. **Kelly, M. A.**, Ghafurian, M., West R. L., & Reitter, D. (2020). . *Journal of Memory and Language, 115,* 104153. doi: 10.1016/j.jml.2020.104153

iii. Vertolli, M. O., **Kelly, M. A.**, & Davies, J. (2018). Coherence in the visual imagination. *Cognitive Science, 42*(3), 885-917. doi: 10.1111/cogs.12569

iv. **Kelly, M. A.** & West, R. L. (2017). Argument complexity: Teaching undergrads to make better arguments. *Psychology Teaching Review, 23*(2), 20-31. https://shop.bps.org.uk/publications/publications-by-subject/psychology-teaching-review-vol-23-no-2-2017.html

v. **Kelly M. A.**, Mewhort, D. J. K., & West, R. L. (2017). The memory tesseract: Mathematical equivalence between composite and separate storage memory models. *Journal of Mathematical Psychology*, *77*, 142-155. doi: 10.1016/j.jmp.2016.10.006

vi. Rutledge-Taylor, M. F., **Kelly M. A.**, West, R. L., & Pyke, A. A. (2014). Dynamically structured holographic memory. *Biologically Inspired Cognitive Architectures, 9,* 9-32. doi: 10.1016/j.bica.2014.06.001

vii. **Kelly, M. A.**, Blostein, D., & Mewhort, D. J. K. (2013). Encoding structure in holographic reduced representations. *Canadian Journal of Experimental Psychology*, *67,* 79-93. doi: 10.1037/a0030301

viii. Mewhort, D. J. K., Johns, B. T., & **Kelly, M.** (2010). Applying the permutation test to factorial designs. *Behavior Research Methods, 42*, 366-372. doi: 10.3758/BRM.42.2.366

ix. Mewhort, D. J. K., **Kelly, M.**, & Johns, B. T. (2009). Randomization tests and the unequal-N/unequal-variance problem. *Behavior Research Methods, 41*, 664-667. doi: 10.3758/BRM.41.3.664

b. Articles published in refereed conference proceedings

i. Ororbia, A. G., **Kelly, M. A.** (2023). Maze Learning Using a Hyperdimensional Predictive Processing Cognitive Architecture. In Goertzel, B., Iklé, M., Potapov, A., Ponomaryov, D. (Eds.), *Artificial General Intelligence AGI 2022 Lecture Notes in Computer Science*, *13539*, 321-331. Springer, Cham. https://doi.org/10.1007/978-3-031-19907-3_31

ii. Ororbia, A. G. & **Kelly, M. A.** (2022). CogNGen: Constructing the kernel of a hyperdimensional predictive processing cognitive architecture. In J. Culbertson, A. Perfors, H. Rabagliati, & V. Ramenzoni (Eds.), *Proceedings of the 44th Annual Conference of the Cognitive Science Society* (pp. 1322-1329). Toronto, ON: Cognitive Science Society. https://cognitivesciencesociety.org/wp-content/uploads/2022/07/CogSci2022Proceedings-1.pdf doi: 10.31234/osf.io/g6hf4

iii. Wang, J., **Kelly, M. A.**, & Reitter, D. (2020). Do we need neural models to explain human judgments of acceptability? In S. Denison, M. Mack, Y. Xu, B. Armstrong (Eds.), *Proceedings of the 42nd Annual Conference of the Cognitive Science Society* (pp. 1289-1295). Austin, TX: Cognitive Science Society. https://cognitivesciencesociety.org/cogsci20/papers/0251/0251.pdf

iv. **Kelly, M. A**., Xu, Y., Calvillo, J., & Reitter, D. (2020). Which sentence embeddings and which layers encode syntactic structure? In S. Denison, M. Mack, Y. Xu, B. Armstrong (Eds.), *Proceedings of the 42nd Annual Conference of the Cognitive Science Society* (pp. 2375-2381). Austin, TX: Cognitive Science Society. https://cognitivesciencesociety.org/cogsci20/papers/0564/0564.pdf

v. Ororbia II, A. G., Mali, A., **Kelly, M. A.**, & Reitter, D. (2019). Like a baby: Visually situated neural language acquisition. In *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics* (pp. 5127-5136). Florence, Italy: Association for Computational Linguistics. https://www.aclweb.org/anthology/P19-1506

vi. Arora, N., West, R., Brook, A., & **Kelly, M. A.** (2018). Why the common model of cognition needs holographic a-priori categories. In J. Laird, C. Lebiere, & P. S. Rosenbloom (Eds.), *Papers on the Common Model of Cognition*, *Procedia Computer Science*, *145*, 680-690. doi: 10.1016/j.procs.2018.11.060

vii. **Kelly, M. A.**, & Reitter, D. (2018). How language processing can shape a common model of cognition. In J. Laird, C. Lebiere, & P. S. Rosenbloom (Eds.), *Papers on the Common Model of Cognition*, *Procedia Computer Science*, *145*, 724-729. doi: 10.1016/j.procs.2018.11.047

viii. **Kelly, M. A.**, & West, R. L. (2017). A framework for computational models of human memory. In J. Laird, C. Lebiere, & P. S. Rosenbloom (Organizers), *The 2017 AAAI Fall Symposium Series: Technical Reports* (pp. 376-381). Palo Alto, California: The AAAI Press. https://aaai.org/ocs/index.php/FSS/FSS17/paper/view/15952

ix. **Kelly, M. A.**, & Reitter, D. (2017). Holographic Declarative Memory: Using distributional semantics within ACT-R. In J. Laird, C. Lebiere, & P. S. Rosenbloom (Organizers), *The 2017 AAAI Fall Symposium Series: Technical Reports* (pp. 382-387). Palo Alto, California: The AAAI Press. https://aaai.org/ocs/index.php/FSS/FSS17/paper/view/16001

x. **Kelly, M. A.**, Reitter, D., & West, R. L. (2017). Degrees of separation in semantic and syntactic relationships. In M. K. van Vugt, A. P. Banks, & W. G. Kennedy (Eds.), *Proceedings of the 15th International Conference on Cognitive Modeling* (pp. 199-204). Coventry, United Kingdom: University of Warwick. https://iccm-conference.neocities.org/2017/ICCMprogram_files/paper_42.pdf

xi. Kwok, K., West, R. L., & **Kelly, M. A.** (2015). The fan effect in overlapping data sets and logical inference. In D. C. Noelle, R. Dale, A. S. Warlaumont, J. Yoshimi, T. Matlock, C. D. Jennings, & P. P. Maglio (Eds.), *Proceedings of the 37th Annual Conference of the Cognitive Science Society* (pp. 1231-1236). Austin, TX: Cognitive Science Society. https://mindmodeling.org/cogsci2015/papers/0217/

xii. **Kelly, M. A.**, Kwok, K., & West, R. L. (2015). Holographic declarative memory and the fan effect: A test case for a new memory model for ACT-R. In N. A. Taatgen, M. K. van Vugt, J. P. Borst, & K. Mehlhorn (Eds.), *Proceedings of the 13th International Conference on Cognitive Modeling* (pp. 148-153). Groningen, the Netherlands: University of Groningen. https://iccm-conference.neocities.org/2015/proceedings/papers/0036/paper0036.pdf

xiii. Vertolli, M. O., **Kelly, M. A.**, & Davies, J. (2014). Compression and decompression in cognition. In Goertzel, B., Orseau, L., & Snaider, J. (Eds.), *Proceedings of the 7th Conference on Artificial General Intelligence* (pp. 262-265). Quebec City, Canada. doi: 10.1007/978-3-319-09274-4_30

xiv. **Kelly, M. A.**, Mewhort, D. J. K., & West, R. L. (2014). The memory tesseract: Distributed MINERVA and the unification of memory. In Bello, P., Guarini, M., McShane, M., & Scassellati, B. (Eds.), *Proceedings of the 36th Annual Conference of the Cognitive Science Society* (pp. 2483-2488). Austin, TX: Cognitive Science Society. https://mindmodeling.org/cogsci2014/papers/431/

xv. **Kelly, M. A.** & West, R. L. (2013). Decision-making in a dynamically structured holographic memory: Learning from delayed feedback. In R. West & T. Stewart (eds.), *Proceedings of the 12th International Conference on Cognitive Modeling* (pp. 47-52). Ottawa, Canada: Carleton University. https://carleton.ca/ics/wp-content/uploads/Kelly-West-2013-ICS.pdf

xvi. **Kelly, M. A.** & West, R. L. (2012). From vectors to symbols to cognition: The symbolic and sub-symbolic aspects of vector-symbolic cognitive models. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th Annual Conference of the Cognitive Science Society* (pp. 1768-1773). Austin, TX: Cognitive Science Society. http://mindmodeling.org/cogsci2012/papers/0311/

c. Theses

i. **Kelly, M. A.** (2016). *The memory tesseract: Developing a unified framework for modelling memory and cognition* (Doctoral dissertation, Carleton University, Canada). CURVE Theses and Dissertations Collection. https://curve.carleton.ca/9d053d1d-0bfb-4109-a9a1-70a34873014a

ii. **Kelly, M. A.** (2010). *Advancing the theory and utility of holographic reduced representations* (Master's thesis, Queen's University, Canada). ProQuest Dissertations and Theses. http://search.proquest.com/docview/853293422

iii. **Kelly, M. A.** (2008). *A review of computational models of word recognition and pronunciation* (Honours' thesis, Queen's University, Canada). doi: 10.31234/osf.io/39fqa

d. Works in press

i. Ozen, R., West, R. L., & **Kelly, M. A.** (in press). Minerva-Q: A multiple-trace memory system for reinforcement learning. In Stewart, T. C. (Ed.), *Proceedings of the 20th International Conference on Cognitive Modeling*. https://www.researchgate.net/publication/366091063_Minerva-Q_A_Multiple-Trace_Memory_System_for_Reinforcement_Learning

e. Pre-prints and technical reports

i. Tomkins-Flanagan, E., and **Kelly, M. A.** *Hilbert Didn't Pave the Road to a Research Program.*

ii. Nguyen, K., Tang, Z., Mali, A. and **Kelly, M. A.** *Like a bilingual baby: The advantage of visually grounding a bilingual language model*. http://arxiv.org/abs/2210.05487

7. Papers Presented

a. At Learned Societies or Academic Bodies outside of Carleton University

i. Richard, E. & **Kelly, M. A.** (2022, November). *Detecting Parkinson's disease using machine learning from movement and memory data*. Poster at AI in Aging and Age-Related Diseases.

ii. Ororbia, A. G. & **Kelly, M. A**. (2021, September). *Towards a predictive processing implementation of the common model of cognition*. Talk in the Online Webinars on Developments in Hyperdimensional Computing and Vector-Symbolic Architectures. https://youtu.be/BtnUvpQg6bI https://www.hd-computing.com/webinars

iii. Ororbia, A. G. & **Kelly, M. A**. (2021, July). Towards a predictive processing implementation of the common model of cognition [Abstract]. In Stewart, T. C. (Ed.) *Proceedings of the 19th International Conference on Cognitive Modelling* (pp. 204-205). University Park, PA: Applied Cognitive Science Lab, Penn State. https://youtu.be/dJKjFNwZ_QU https://arxiv.org/abs/2105.07308 http://acs.ist.psu.edu/papers/ICCM2021Proceedings.pdf

iv. **Kelly, M. A**. (2021, July). *Imaginary ELFs and other things you've never seen before: A comparative analysis of computational memory models on the fan and extra-list feature effects*. Talk presented at the 2021 annual joint meeting of the Society for Mathematical Psychology and the International Conference on Cognitive Modeling. https://youtu.be/f4zahgeDRdE

v. **Kelly, M. A**. (2021, June). *Imaginary ELFs and other things you've never seen before: A comparative analysis of computational memory models on the fan and extra-list feature effects*. Poster presented at the 30th Annual meeting of the Canadian Society for Brain, Behaviour and Cognitive Science. https://youtu.be/it5eQMHsiFM

vi. **Kelly, M. A**., Xu, Y., Calvillo, J., & Reitter, D. (2020, July). *Which sentence embeddings and which layers encode syntactic structure?* Poster at the 42nd Annual Conference of the Cognitive Science Society. https://youtu.be/ymtgr8KtrQs

vii. **Kelly, M. A.**, Ghafurian, M., West R. L., & Reitter, D. (2020, June) *Indirect Associations in Learning Semantic and Syntactic Lexical Relationships*. Talk in the Online Webinars on Developments in Hyperdimensional Computing and Vector-Symbolic Architectures. https://youtu.be/DZo_GEImFjw https://www.hd-computing.com/webinars

viii. **Kelly, M. A.**, Arora, N., West R. L., & Reitter, D. (2019, July). *High-dimensional vector spaces as the architecture of cognition*. Talk at the Department of Psychology, Carnegie Melon University. Pittsburgh, PA, USA.

ix. **Kelly, M. A.**, Arora, N., West R. L., & Reitter, D. (2019, July). High-dimensional vector spaces as the architecture of cognition [Abstract]. In A.K. Goel, C.M. Seifert, & C. Freksa (Eds.), *Proceedings of the 41st Annual Conference of the Cognitive Science Society* (p. 3491). Montreal, QB: Cognitive Science Society.

x. **Kelly, M. A.**, Reitter, D., West, R. L., & Ghafurian, M. (2019, June). *Indirect associations in learning semantic and syntactic lexical relationships*. Talk at the 29th Annual Meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science. Waterloo, Canada: University of Waterloo.

xi. D'Orazio, V., **Kelly, M. A.**, Kenwick, M., Terechshenko, Z., Palmer, G., & Reitter, D. (2018, Nov.). *Experiments with crowdsourcing to collect conflict data.* Talk at the 52nd Peace Science Society International North American Meeting. Austin, Texas: University of Texas.

xii. **Kelly, M. A.**, Reitter, D., & West, R. L. (2017, September). *Degrees of Separation in Semantic and Syntactic Relationships*. Talk at the Department of Psychological and Brain Sciences, Indiana University Bloomington. Bloomington, IN, USA.

xiii. **Kelly, M. A.** (2017, July). *Using distributional semantics techniques with ACT-R to handle corpora and other large datasets*. Talk at the Twenty-Fourth Annual ACT-R Post-Graduate Summer School. London, United Kingdom: University College London.

xiv. **Kelly, M. A.** (2016, August). Holographic Declarative Memory: A Scalable Memory Module. In *Proceedings of the Twenty-Third Annual ACT-R Post-Graduate Summer School*. Pittsburgh, PA: Department of Psychology, Carnegie Mellon University.

xv. **Kelly, M. A.**, & West, R. L. (2016, August). A computational model of memory for abstract associations [Abstract]. In D. Reitter & F. E. Ritter (Eds.), *Proceedings of the 14th International Conference on Cognitive Modeling* (pp. 279–281). University Park, PA: Penn State. http://acs.ist.psu.edu/iccm2016/proceedings/kelly2016iccm.pdf

xvi. **Kelly, M. A.**, & West, R. L. (2016, June). *A Computational Model of Memory for Abstract Associations*. Poster presented at the 26th Annual Meeting of the Canadian Society for Brain, Behaviour and Cognitive Science, University of Ottawa, Ottawa, Canada.

xvii. **Kelly, M. A.**, & West, R. L. (2015, July). *Argument Complexity: Teaching Undergrads and Fighting Terrorism*. Talk for the 5th Vancouver International Conference on the Teaching of Psychology, Vancouver, Canada.

xviii. West, R. L., & **Kelly, M. A.** (2015, June). *Argument Complexity: Teaching Undergrads and Fighting Terrorism*. Poster presented at the 25th Annual Meeting of the Canadian Society for Brain, Behaviour and Cognitive Science, Carleton University, Ottawa, Canada.

xix. **Kelly, M. A.**, Kwok, K., & West, R. L. (2015, June). *Holographic declarative memory and the fan effect: A test case for a new memory model for ACT-R*. Poster presented at the 25th

Annual Meeting of the Canadian Society for Brain, Behaviour and Cognitive Science, Carleton University, Ottawa, Canada.

xx. **Kelly, M. A.**, Mewhort, D. J. K., & West, R. L. (2014, July). *The memory tesseract: Distributed MINERVA and the unification of memory*. Talk for the 47th Annual Meeting of the Society for Mathematical Psychology, Quebec City, Canada.

xxi. **Kelly, M. A.** & West, R. L. (2012, July). Modelling decision-making in prisoner's dilemma. In *Proceedings of the 19th annual ACT-R Workshop.* Pittsburgh, PA: Department of Psychology, Carnegie Mellon University. http://act-r.psy.cmu.edu/wordpress/wp-content/themes/ACT-R/workshops/2012/Kelly_West.pptx

xxii. Cebulski, S., Christie, E., Kelly, D., **Kelly, M. A.**, & Plante, S. (2012, June). *Modelling decision-making in prisoner's dilemma*. Poster presented at the 22nd annual meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science, Queen's University, Kingston, Canada.

xxiii. **Kelly, M. A.** & R. L. West (2011, July). Holographic reduced representations and vector symbolic architectures as tools for cognitive modelling [Abstract]. In Carlson, L., Hoelscher, C., & Shipley, T. F. (Eds.), *Proceedings of the 33rd Annual Conference of the Cognitive Science Society* (p. 3265). Austin, TX: Cognitive Science Society.

xxiv. **Kelly, M. A.**, Blostein, D., & Mewhort, D. J. K. (2011, June). *Encoding structure in holographic reduced representations.* Poster to be presented at the 21st annual meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science, University of Manitoba, Winnipeg, Manitoba.

b. Non-Academic talks

i. **Kelly, M. A.** (2021, March). *Queer in Artificial Intelligence and Cognitive Science.* Talk given at the Gender and Sexuality Alliance at Bucknell University for Pride Week.

c. Sessions chaired

i. Facilitator for the Common Model of Cognition working group on declarative memory (2017): https://lists.andrew.cmu.edu/mailman/listinfo/common-model

ii. Chair for the session *Declarative Memory* for AAAI Fall Symposium on a Standard Model of the Mind (2017).

iii. Chaired and co-organized (with Dr. D. J. K. Mewhort) the *Computational understanding of cognition* symposium at the 22nd annual meeting of the Canadian Society for Brain, Behaviour, and Cognitive Science (CSBBCS 2012), Queen's University, Kingston, ON.

d. **Invited talks within institution**

i. Guest speaker at Bucknell University for CSCI 201 “Computer Science Seminar” in Fall 2020.

ii. Guest lecturer at Carleton University for CGSC 6004 “Cognitive Modeling for Cognitive Science” in Fall 2015, a graduate course on computational models of cognition with a particular focus on ACT-R. CGSC 6004 taught by Dr. Robert West.

iii. Guest lecturer at Carleton University for CGSC 1001 “Mysteries of the Mind”, a first-year course, in Fall 2012 and again in Winter 2014. CGSC 1001 taught by Deirdre Kelly.

iv. Guest lecturer at Carleton University for CGSC 2002, "Theories and Methods in Cognitive Science", a second-year course, in Winter 2014. CGSC 2002 taught by Dr. Ida Toivonen.

8. Research Grants Received

a. *Modernizing the AI & Cognitive Science Labs to Give Students Practical Experience with Current AI.* Carleton University Experiential Learning Fund, 2022, for $2 500 CAD.

b. *Holographic implementation of the common model of cognition.* CU NSERC Research Development Grant from Carleton University, 2022, for $10 000 CAD.

c. Lead author of the proposal *CompCog: Computational, distributed accounts of human memory: improving cognitive models*. Grant BCS-1734304 from the National Science Foundation (Perception, Action, & Cognition program, co-funded by the Robust Intelligence program), 2017-2020, for $500 000 USD. Principal investigators: David Reitter, **M. A. Kelly**, Prasenjit Mitra.

d. *Inferring the semantics and syntax of natural language using a holographic memory model sensitive to arbitrarily abstract associations.* Natural Sciences and Engineering Research Council Postdoctoral Fellowship, 2018-2019, for $90 000 CAD. Ranked #3 by the Computer Science Committee (NSERC #198) out of 40 applications to the committee.

9. Service to the Profession

a. Professional memberships

i. Review Editor for *Frontiers in Cognition: Neural Networks and Cognition*.

ii. Member #6226196 of the ACM (Association for Computing Machinery) and ACM-W (Association for Computer Machinery's Council on Women in Computing) since 2020

iii. Member of the Cognitive Science Society since 2011.

iv. Member of the Canadian Society for Brain, Behaviour and Cognitive Science since 2011.

b. Manuscript appraisals for journals and conference proceedings

i. Reviewer for the journal *Scientific Reports* (2023, 1 paper).

ii. Reviewer for the *Canadian Journal of Experimental Psychology* (2022, 1 paper).

iii. Reviewer for the Annual Meeting of the International Conference on Cognitive Modelling (ICCM 2022, 3 papers; ICCM 2021, 2 papers; ICCM 2020, 4 papers; ICCM 2016, 3 papers; ICCM 2013, 5 papers).

iv. Reviewer for the journal *ACM Computing Surveys* (2022, 2 papers).

v. Reviewer for the International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS 2021, 3 papers).

vi. Reviewer for the journal *Topics in Cognitive Science* (2021, 1 paper, 1st & 2nd drafts).

vii. Reviewer for the Annual Conference of the Cognitive Science Society (CogSci 2021, 4 papers; CogSci 2020, 3 papers; CogSci 2015, 3 papers; CogSci 2014, 3 papers).

viii. Reviewer for the journal *Behavioral Research Methods* (2021, 1 paper, 1st & 2nd drafts; 2017, 1 paper).

ix. Reviewer for the journal *Cognitive Science* (2021, 1 paper; 2020, 1 paper).

x. Reviewer for the Annual Meeting of the Association for Computational Linguistics (ACL 2020, 1 paper; ACL 2019, 2 papers; ACL 2017; 2 papers).

xi. Reviewer for the journal *IEEE Access* (2019, 1 paper).

xii. Reviewer for the Conference on Empirical Methods in Natural Language Processing (EMNLP-IJCNLP 2019, 2 papers; EMNLP 2017; 3 papers).

xiii. Reviewer for the Association for the Advancement of Artificial Intelligence Conference on Artificial Intelligence (AAAI 2018; 2 papers; AAAI 2017; 1 paper).

xiv. Reviewer for the *Journal of Mathematical Psychology* (2017, 1 paper, 1st, 2nd, & 3rd drafts).

c. Assessment of university programs at other universities

i. Submitted a letter of support for Rochester Institute of Technology's proposed Ph.D. program in cognitive science at the request of the program committee (2020, August).

d. Conference organization

i. Faculty organizer for the 2022 Spring Conference (Carleton Cognitive Science Undergraduate and Graduate Research Conference).

ii. Organizer for the Institute of Cognitive Science's NENGO Workshop on Computational Neuro-Cognitive Modelling in Fall 2014.

iii. Volunteer student organizer for the International Conference on Cognitive Modelling (ICCM 2013) in Ottawa, ON, July 2013, helping to organize and run the conference.

10. Academic Responsibilities

a. Graduate and undergraduate courses and seminars taught

i. Instructor at Carleton University for CGSC 3601, "Artificial Intelligence and Cognitive Science" since Fall 2021. An introduction to artificial intelligence and machine learning for cognitive scientists. 3 contact hours per week.

ii. Instructor at Carleton University for FYSM 1607, "Thinking and Knowing" from Fall 2022 to Winter 2023. A first year seminar on cognitive science. 3 contact hours per week.

iii. Instructor at Carleton University for CGSC 5001, "Cognition and Artificial Cognitive Systems" in Winter 2022. A seminar on the contribution of artificial intelligence and computer modelling of cognitive processes to cognitive science. 3 contact hours per week.

iv. Instructor at Bucknell University for CSCI 308, “Programming Language Design” in Winter 2021, a course on the procedural, functional, logic, and object-oriented programming paradigms. 7.5 contact hours per week. Team taught with Dr. Lea Wittie.

v. Instructor at Bucknell University for CSCI 203 “Introduction to Computer Science” in Fall 2020 and Winter 2021, an introductory programming course taught in Python. 7 contact hours per week in Winter 2021. 6 contact hours per week in Fall 2020.

vi. Contract Instructor at Carleton for CGSC 3201A “Empirical Issues in Cognitive Science”, in Fall 2015, a third-year research seminar that surveys topics and methods in cognitive psychology. 3 contact hours per week.

vii. Teaching Assistant at Carleton University for FYSM 1400, a first-year seminar, “Cognition: A Scientific Exploration of the Mind”, in Fall 2013, Winter 2014, Fall 2014, and Winter 2015. FYSM 1400 taught by Dr. Robert L. West. I unofficially became the instructor starting in early Winter 2015, due to an emergency leave of absence by Dr. West, until the final weeks of Winter 2015, when it was taught by Dr. Kathleen Van Benthem. 3 contact hours per week.

viii. Teaching Assistant at Carleton University for FYSM 1607, “Cognitive Science: Thinking and Knowing”, a first-year seminar, in Fall 2014. FYSM 1607 taught by Dr. Raj Singh.

ix. Teaching Assistant at Carleton for PHIL 1301, "Mind, World, and Knowledge", a first-year course, in Winter 2012. PHIL 1301 taught by Dr. Jordan Dodd.

x. Teaching Assistant at Carleton University for PSYC 1001, “Introduction to Psychology 1”, a first-year course, in Fall 2011, sections taught by Dr. Chris Motz and Dr. Ayca Guler-Edwards.

xi. Teaching Assistant at Carleton University for PHIL 2003, “Critical Thinking”, in Fall 2010, and PHIL 2001, “Introduction to Symbolic Logic”, in Winter 2011. PHIL 2003 taught by Dr. David Matheson. PHIL 2001 taught by Dr. Jordan Dodd.

xii. Teaching Assistant at Queen’s University for COGS 100, “Introduction to Cognitive Science”, a first-year course, in Fall 2008 and Fall 2009. COGS 100 taught by Dr. Roger Browse.

b. Research projects supervised

i. Emma Richard (B.Cog.Sc.) in Summer 2022, NSERC USRA scholarship student. *Detecting Parkinson’s disease using machine learning from movement data*.

ii. Irina Smirnova-Godoy (Ph.D.) in Fall 2021. Using word embeddings to analyze the differences in how Russian and English monolinguals, and Russian-English bilinguals use emotion words.

iii. Nguyen Nguyen (B.Sc.) since Summer 2021. *Like a bilingual baby: The advantage of visually grounding a bilingual language model*.

iv. Vy Dao (B.Sc.) in Summer 2021. *The Ethical Challenges of Artificial Intelligence: a Literature Review*.

v. Wang Jing (Ph.D.) in Fall 2017 and Winter 2018. *Do We Need Neural Models to Explain Human Judgments of Acceptability?* Co-supervised with David Reitter.

vi. Moojan Ghafurian (Ph.D.) in Fall 2017 and Winter 2018. Analysis of the correlations between the syntactic structures of combinatory categorical grammar and the statistical information in word embeddings. Co-supervised with David Reitter.

vii. Saranya Venkatraman (Ph.D.) in Fall 2017 and Winter 2018. Deep neural network approaches to modelling syntax and part-of-speech. Co-supervised with David Reitter.

c. Theses supervised

i. Chenrong Qin. *Moral decision making under monetary considerations*. Master of Science in Information Science and Technology. College of Information Science and Technology, Pennsylvania State University. Completed May, 2019. Co-supervised with David Reitter.

d. Theses boards participated on in a capacity other than supervisor

i. Prospectus committee member for Tristan A. Shaeen (2023, March). *From Neurons to Narrative with Newell's Systems Levels: A Unification of Culture and Cognitive Science.* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

ii. Prospectus committee member for Spencer Eckler (2022, November). *Constructing Causal Knowledge Representation with the Common Model of Cognition.* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

iii. Prospectus committee member for Brendan Conway-Smith (2022, November). Ph.D. in Cognitive Science. Department of Cognitive Science, Carleton University.

iv. Defence committee member for Samer Al Assafin (2022, September). *Empirical Study on Improving Hate Speech Detection: Novel BERT based One-Versus-All Classification Approach (BOVAC) with a Novel Performance Metric: Global Performance (GP).* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

v. Defence committee member for Maia Caughey (2022, September). *Investigating the utility of different types of self-explanation prompts during programming activities*. Master of Cognitive Science. Department of Cognitive Science, Carleton University.

vi. Defence committee chair for Christy Laarakker (2022, August). *Inner and Outer Time in our Perception of Music.* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

vii. Prospectus committee member for Elisabeth Reid (2022, August). *Understanding Micro Cognition and Macro Cognition using SGOMS/ACT-R predictions of a SGOMS based Mobile Application.* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

viii. Defence committee member for Nico Turcas (2022, July). *Modelling the Accuracy Rates of Spatial Relational Reasoning Problems: An Analysis Facilitating ACT-R and PRISM Theory* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

ix. Prospectus committee member for Nico Turcas (2022, June). *Modelling the Accuracy Rates of Spatial Relational Reasoning Problems: An Analysis Facilitating ACT-R and PRISM Theory* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

x. Prospectus committee member for Samer Al Assafin (2022, April). *Empirical Study on Sentiment Analysis: BERT-based One-Versus-All Classification Approach (BOVAC) With A Novel Performance Metric: Global Performance (GP).* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

xi. Prospectus committee member for Maia Caughey (2021, October). *Investigating the utility of different types of self-explanation prompts during programming activities*. Master of Cognitive Science. Department of Cognitive Science, Carleton University.

xii. Defence chair for Taeko Bourque (2021, August). *Simulating human visual imagination: Scaling and placement of objects in procedural generation of 3D scenes.* Master of Cognitive Science. Department of Cognitive Science, Carleton University.

e. Innovative teaching methods deployed

i. For CSCI 308, "Programming Language Design" in Winter 2021 at Bucknell University, I re-tooled the course to a "flipped classroom" format. Students watched short, polished, scripted 5 to 10 minute videos on course topics outside of contact hours. Brief, online quizzes for each video served to ensure the students had watched the video. During contact hours with me, students worked in-class on group activities, assignments, programming labs, exams, and the term project. Flipping the course was a labour intensive process that involved creating both the videos for outside contact hours and the activities and assignments for contact hours. Students were surveyed at the end of the course on how the flipped classroom format worked for them and students indicated in their feedback an overwhelming preference for the flipped format.

11. Administrative Responsibilities and Committee Assignments

i. Departmental

i. Faculty organizer for the 2022 Spring Conference (Carleton Cognitive Science Undergraduate and Graduate Research Conference) held April 29th-30th.

ii. University

i. Tenure and Promotion Committee member, Fall 2022.

ii. Consultation with the Joint Committee for Employment Equity, Diversity, and Inclusion (JCEEDI) on the Carleton Trans Advocacy Group (CTAG) calls to action (April, 2022).

iii. Departmental representative for Cognitive Science on the Artificial Intelligence Working Group on the creation of a formal research entity and collaborative specializations for artificial intelligence at Carleton University, since January, 2022.

iii. External (Bucknell University)

i. Fulbright application campus committee member, Winter 2021 and Fall 2020.

ii. Faculty advisor for the ACM-W (Association for Computing Machinery's Council on Women in Computing) student chapter, Winter 2021 and Fall 2020.