Elizabeth Zavitz, PhD

Department of Physiology
Monash University
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EDUCATION

2007-2013 **Doctor of Philosophy (PhD.), in Psychology**
McGill University, Montreal, Quebec, Canada
Thesis: The role of higher-order statistics in texture segmentation

2003-2007 **Bachelor of Computing (BComp.) in Cognitive Science**
Queen's University, Kingston, Ontario, Canada
Thesis: Approaches in image classification problems

PUBLISHED PAPERS

Feizpour A., Majka P., Chaplin T.A., Rowley D.P., Yu, H.-H., **Zavitz, E.**, Price, N.S.C., Rosa, M.G.P., Hagan, M.A. (2021). Visual responses in the dorsolateral frontal cortex of marmoset monkeys. *Journal of Neurophysiology, 125(1): 296-304*.

Yu, H.-H., Rowley, D. P., Price, N. S. C., Rosa, M. G. P., & **Zavitz, E.** (2020). A twisted visual field map in the primate cortex predicted by topographic continuity. *Science Advances, 6(44)*: eaaz8673.

Zavitz, E. & Price, N.S.C. (2019). Weighting neurons by selectivity produces near optimal population codes. *Journal of Neurophysiology, 121*(5): 1924-1937.

Ghodrati, M., **Zavitz, E.**, Rosa, M.G.P. & Price, N.S.C. (2019). Contrast and luminance adaptation alter neuronal coding and perception of stimulus orientation. *Nature Communications, 10*(1): 941.

Zavitz, E. & Price, N.S.C. (2019). Understanding sensory information processing through simultaneous multi-area population recordings. *Frontiers in Neural Circuits, 12*(115).

Zavitz, E., Yu, H.-H., Rosa, M.G.P. & Price, N.S.C. (2019) Correlated variability in the neurons with the strongest tuning improves direction coding. *Cerebral Cortex, 29*(2): 615-626.

Zavitz, E., Yu, H.-H., Rowe, E.G., Rosa, M.G.P. & Price, N.S.C. (2016). Rapid Adaptation Induces Persistent Biases in Population Codes for Visual Motion, *Journal of Neuroscience, 36*(16): 4579-4590.

> *Featured in a journal club:* Haak, K.V. & Mesik J. (2016). Adaptation, the Coding Catastrophe and Disaster Management in Natural Vision. *Journal of Neuroscience*, 36(36):9286-9288.

Zavitz, E. & Baker, C.L. (2014). Higher-order image structure enables boundary segmentation in the absence of luminance or contrast cues, *Journal of Vision, 14*(4): 1-14.

Zavitz, E. & Baker, C.L. (2013). Texture sparseness, but not local phase structure, impairs second-order segmentation, *Vision Research, 91*: 45-55.

Arsenault, E., Yoonessi, A. & Baker, C. (2011). Higher order texture statistics impair contrast
boundary segmentation. *Journal of Vision, 11*(10), 1-15.

Ouellette-Kuntz, H., Burge, P., Brown, H.K., **Arsenault, E.** (2010). Public attitudes towards individuals with intellectual disabilities as measured by the concept of social distance. *Journal of Applied Research in Intellectual Disabilities, 23*(2): 132-142.

PREPRINTS

Kermani M., **Zavitz, E.**, Oakley, B.H., Price, N.S.C., Hagan, M.A., Wong, Y.T.. *Long-range neural coherence encodes stimulus information in primate visual cortex. biorXiv.* https://doi.org/10.1101/2020.06.22.164269 (*Submitted to a journal*)

BOOK CHAPTERS

Zavitz, E., Price, N.S.C, & Rosa, M.G.P.. (2016). Primate Visual Cortex, in Neuroscience and Biobehavioral Psychology. Elsevier.

Price, N.S.C., **Zavitz, E.**, & Born, R.T. (2016). Representation of Movement, in Neuroscience and Biobehavioral Psychology. Elsevier

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GRANTS, FELLOWSHIPS AND AWARDS

2020	ARC Discovery Project	$492,586 AUD
2019	CIBF Special Initiative Project Grant	$125,520 AUD
2019	Senior Postdoctoral Fellowship	$70,000 AUD
2019	CIBF Special Initiative Project Grant	$20,920 AUD
2018	CIBF Special Initiative Project Grant	$12,500 AUD
2018	CIBF Early Career Researcher Travel Grant	$300 AUD
2018	FENS Forum Travel Award	€750 EUR
2018	BDI Travel Award	$2,000 AUD
2017	CIBF Early Career Researcher Travel Grant	$1,000 AUD
2016	CIBF David Van Essen Award for Highest-Achieving Early Career Researcher	
2016	CIBF Early Career Researcher Travel Grant	$2,000 AUD
2016	Monash University Platform Access Grant	$14,000 AUD
2015	Cold Spring Harbour Laboratories Tuition Waiver	$1,750 USD
2014	School of Biomedical Sciences Travel Grant	$1,500 AUD
2009	Provost's Graduate Recruitment Fellowship	$1,500 CAD
2003	Queen's University Entrance Scholarship	$1,000 CAD

GRADUATE SUPERVISION

Joanita D'souza - Co-supervisor (15%)
Thesis: Neural circuits for the modulation of visual attention

Brian Oakley - Co-supervisor (15%)
Thesis: Characterising the transformations of visual information occurring between hierarchically-connected visual areas
Submitted for examination December 2020, Product Analyst at Whispir Limited

Dr. Declan Rowley - Primary Supervisor (90%)
Thesis: Feature selectivity within and across areas of the primate visual cortex
Completed March 2020, Postdoctoral fellow at University of Texas, Austin

UNDERGRADUATE SUPERVISION

2020	PHY 3990 Morgan Williamson *Communication subspaces between V1 and MT* PHY 3990 Nathaniel Parsons *Population coupling in the visual cortex* PHY 3990 Aaron Chan *Deep neural networks for predicting brain activity*
2019	PHY 3990 Brittany Suttie *Topography of functional connectivity in primate visual cortex*
2018	Honours: Joanita D'souza (3rd in cohort, RTP scholarship) *Laminar differences in neural response properties in marmoset MT*
2016	Honours: Brian Oakley (2nd in cohort, RTP scholarship) *How does the brain process rapid serial visual motion?*
2014	PHY 3990: Elise Rowe (1st in cohort, RTP scholarship) *Adaptation in visual area MT*

UNDERGRADUATE TEACHING

Mentor, 2019	ADS 1001 Data Challenges I *How do single neurons encode visual information?*
Lecturer	
2013	Computational Neuroscience (in general Neuroscience class)
2019, 2020	Masters Course in Neuroscience, Module leader
2021	Sensory and Cognitive Neuroscience
Creator,	Sensory and Cognitive Neuroscience Practical: "Neuromyths"

Facilitator 2015-2019, 2021	Evaluating and Communicating Science
Teaching Assistant Psychology 2009-2012	Winter 2009, Fall 2009, Fall 2010: PSYC 315 Computational Winter 2011: PSYC 212 Perception Winter 2012: PSYC 318 Behavioural Neuroscience

INTERNATIONAL INVITED TALKS

August 2020 modern *fully funded*	Keynote, Panel Member: Brain modeling to capture underlying neuroscience datasets across spatial and temporal scales International Neuroinformatics Coordinating Facility Annual Congress Seattle, USA (**cancelled due to COVID-19**)
July 2020 *fully funded*	Meeting, Neural basis of decision making in a changing environment Satellite meeting to Japan Neuroscience Society Kobe, Japan (**cancelled due to COVID-19**)
July 2018 *fully funded*	International Graduate Program in Neuroscience Symposium Series Ruhr Universität Bochum Bochum, Germany
July 2018	Meeting, Receptive Fields: Analysis, Models, and Applications Satellite meeting to Federation of European Neuroscience Societies Annual Meeting Berlin, Germany
December 2014	McGill Vision Research Seminar Series McGill University Montreal, Canada

NATIONAL INVITED TALKS

September 2019	Workshop, Maths in the brain: Innovations in the application of mathematical methods to understand the brain Turner Institute for Brain and Mental Health Melbourne, Australia
May 2019	Rising Stars Seminar Biomedicine Discovery Institute Melbourne, Australia
December 2018	Symposium, "Sensory and motor processing in cortical circuits in vivo" Australasian Neuroscience Society Annual Meeting Brisbane, Australia
December 2017	Symposium, "Computation in Area MT" Australasian Neuroscience Society Annual Meeting Sydney, Australia

December 2016 *fully funded*	Meeting, "Painting the Big Picture" in Integrative Brain Function Hobart, Australia
August 2014	Workshop, Computational Approaches in Biomedical Research Faculty of Biomedical and Psychological Sciences and the Monash Academy for Cross & Interdisciplinary Mathematical Applications Melbourne, Australia
June 2014	Workshop, Multi-modal approaches to understanding brain function Centre of Excellence for Integrative Brain Function Melbourne, Australia
January 2014	Departmental Seminar University of Western Australia, Department of Psychology Perth, Australia

CONFERENCE ORGANISATION

2019	Organizing committee, session chair, CIBF Annual Science Meeting Adelaide, Australia
2017	Symposium Chair, "A New World in Primate Vision Research: The Marmoset as a Model Animal" at Asia-Pacific Conference in Vision Tainan, Taiwan
2015 Coordinating	Local Organizing Committee, International Neuroinformatics Facility Annual Congress Cairns, Australia

REVIEWING

Federal Funding Agency	Australian Research Council (ARC) National Health and Medical Research Council (NHMRC) *Invited Panel Member for Ideas Grants 2019, declined*
Scientific Journals	Journal of Neurophysiology Journal of Neuroscience Neural Networks PLoS Computational Biology Cerebral Cortex Frontiers in Neuroinformatics Aging Clinical and Experimental Research PLoS One Peer J Nature Scientific Reports
Conference	CoSyNe (Computational and Systems Neuroscience)

PROFESSIONAL DEVELOPMENT

July 2015	Cold Spring Harbour Laboratories Course Vision: A Platform for Linking Circuits, Perception, and Behaviour
June 2015	Nature Masterclass Creating high-impact papers for top-tier journals
September 2012	Tomlinson Project in University-Level Science Education Graduate Teaching Workshop

PROFESSIONAL MEMBERSHIPS

2008-2011	Member, Vision Sciences Society
2014-Present	Member, Society for Neuroscience
2017, 2018	Member, Australasian Neuroscience Society

PUBLIC OUTREACH

2018	From Noise to Meaning: How Visual Information Makes Sense A digital exhibition presented by Monash University Library
2013-2015	CSIRO Scientists in Schools, module on information and codes Caulfield South Primary School 4th grade level
2015	Women in Science Breakfast Alliance of Girls' Schools Victoria Year 11 and 12 Girls
2016	Computational work in neuroscience, lecture and software demo John Monash Science School 11th grade level

CONFERENCE ABSTRACTS

Schmerl, B. A., Rowley, D. P., **Zavitz, E.**, Yu, H-.H., Price, N. S. C., Rosa, M. G. P., McDonnell, M. D.. (2020). Using deep convolutional neural networks to visualise receptive fields of high level visual cortical neurons. *Presented as a poster at CNS*2020, virtual conference.*

Zavitz, E., Hagan, M. A., Oakley, B. H., Wong, Y. T., Price, N. S. C.. (2020). Connectivity for redundancy reduction in neural populations. *Presented as a talk at Systems and Computational Neuroscience Down Under, Brisbane.*

Schmerl, B. A., Rowley, D. P., **Zavitz, E.**, Yu, H-.H., Price, N. S. C., Rosa, M. G. P., McDonnell, M. D.. (2019). Using deep convolutional neural networks to visualise receptive fields of high level visual cortical neurons. *Presented as a talk at NeuroEng, Adelaide.*

Schwenk, J., **Zavitz, E.**, Vanarullen, R., Price, N. S. C., Bremmer, F.. (2019). Neural correlates of perceptual echoes in marmoset primary visual cortex. *Presented as a poster at Society for Neuroscience, Chicago, USA.*

Oakley, B. H., **Zavitz, E.**, Hagan, M. A., Wong, Y. T., Price, N. S. C.. (2019) Action potentials representing visual motion direction are phase-locked to the LFP in area MT in anaesthetised marmosets. *Presented as a poster at Society for Neuroscience, Chicago, USA.*

Zavitz, E., Hagan, M. A., Oakley, B. H., Wong, Y. T., Price, N. S. C.. (2019). Stimulus statistics restructure correlated variability within and between visual areas. *Presented as a poster at CoSyNe, Lisbon.*

Rowley, D., Sadakane, O., Watakabe, A., Tani, T., Abe, H., Ichinohe, N., Mizukami H., **Zavitz, E.**, Yu, H.-H., Rosa, M., Yamamori, T.. (2019). Multi-scale calcium imaging of functional maps in the primate primary visual cortex. *Presented as a poster at CoSyNe, Lisbon.*

Zavitz, E., Hagan, M. A., Oakley, B. H., Wong, Y. T., Price, N. S. C.. (2018). Population codes in V1 and MT are optimised for the structure of natural images. *Presented as a poster at Federation of European Neuroscience Societies Forum, Berlin.*

Zavitz, E., Hagan, M. A., Oakley, B. H., Wong, Y. T., Price, N. S. C.. (2018). Population codes in V1 and MT are optimised for the structure of natural images. *Presented as a poster at AREADNE, Santorini.*

Zavitz, E., Hagan, M. A., Rosa, M. G. P., Yu, H-H., Lui, L. L., Price, N. S. C.. (2017). Population codes in V1 and MT are optimised for the structure of natural images. *Presented as a talk at Systems and Computational Neuroscience Down Under, Brisbane.*

Zavitz, E., Hagan, M. A., Rosa, M. G. P., Yu, H-H., Lui, L. L., Price, N. S. C.. (2017). Stimulus structure impacts population codes for motion within and between visual areas V1 and MT. *Presented as a talk at the Asia-Pacific Conference for Vision, Taiwan.*

Zavitz, E., Yu, H-H., Rosa, M. G. P., Price, N. S. C.. (2016). Task- and time-dependence of population codes for motion in marmoset MT. *Presented as a poster at Society for Neuroscience.*

Zavitz, E., Haghgooie, S., Yu, H.-H., Davies, A. J., Rosa, M. G. P., Price, N. S. C.. (2014). Population coding of motion direction in marmoset area MT is rapid and sustained. *Presented in a nanosymposium at Society for Neuroscience.*

Zavitz, E., Haghgooie, S., Yu, H.-H., Davies, A. J., Rosa, M. G. P., Price, N. S. C.. (2014). Adaptation decorrelates neuronal activity in visual cortex in a tuning-dependent manner. *Presented as a poster at Society for Neuroscience.*

Zavitz, E. & Baker, C.. (2012). Segmentation of boundaries defined by natural and naturalistic textures. *Presented at Sensory Coding and Natural Environment at IST, Austria.*

Arsenault, E. & Baker, C.. (2011). Segmentation mechanisms are sensitive to and can segment by higher-order statistics in naturalistic textures. *Journal of Vision*, 11(11).

Arsenault, E. & Baker, C.. (2010). The role of higher-order statistics in naturalistic texture segmentation: Modelling psychophysical data. *Journal of Vision*, 10(7).

Arsenault, E., Yoonessi, A. & Baker, C.. (2009). Boundary segmentation of naturalistic textures: Roles of sparseness and local phase structure. *Journal of Vision,* 9(8).

Baker, C., Yoonessi, A., & **Arsenault, E.**. (2008). Texture segmentation in natural images: Contribution of higher-order image statistics to psychophysical performance. *Journal of Vision,* 8(6). Presented at VSS.