JOSEPH D VIVIANO

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EDUCATION

2018–2020 **MSc., Computer Science** Université de Montréal, QC/CA.

- Internship Supervised by Dr. Yoshua Bengio
  'Methods for controlling and utilizing saliency maps in medical imaging'.

2011–2013 **MSc. with Distinction, Biology** York University, ON/CA.

- Thesis Supervised by Dr. Keith Schneider
  'Tremotopic mapping of the human thalamic reticular nucleus'.

2005–2009 **BSc. Hons., Psychology.** Queen's University, ON/CA.

- Coursework in Biology, Psychology, Statistics, and Philosophy.

PROFESSIONAL EXPERIENCE

2023–Now **ML Scientist** Yoshua Bengio's Group, Mila Québec AI Institute, QC/CA.

- Lead developer of the open-source GFlowNet library torchgfn with 290 stars, 49 forks, and 15 contributors.
- Applications of GFlowNets to to Antibody Design in collaboration with Amgen.
- Scaling GFlowNets for large-scale distributed search in collaboration with Intel.
- Engineering support for the lab, with a focus on GFLowNets and their applications to ML for Science projects.
- Grant writing for Mila's federal computational infrastructure support and the establishment of a new international AI for Metabolic Engineering research collaboration with the Joint BioEnergy Institute.
- Coordination of the lab's scientific content for lab meetings and retreats.

2021–2022 **ML Research Scientist** Deep Genomics, QC/CA.

- Self-supervised learning (autoregressive and masked-language modelling) for biological sequence representations.
- Multi-modal methods facilitating biological sequence-to-sequence models to generalize to novel cell types.
- Anomaly detection pipeline for our drug screening platform.

2021–2025 **Scientific Mentor** Creative Destruction Lab Montréal, QC/CA.

- Performed technical assessments of startups and provided feedback for a business and investor focused audience.
- Technical direction for startups in the NLP, CV, and ML for Bio spaces.

2020–2021 **Applied Research Scientist** Mila Québec AI Institute, QC/CA.

- Consult on, propose, and implement deep learning solutions for Mila's partners: Optimal portfolio allocation (finance) & digital forgery-detection (fraud).
- Collaboration with Mila researchers on medical applications research and cognitively-inspired AI.

2020 **PhD to VC Fellow** Fifty Years, CA/US.

- Course where I sourced, diligenced, and deep-tech pre-seed/seed stage companies, performed due diligence on them, & helped source technical talent.

2020 **Research Intern** Google, PA/US.

- Built a research pipeline to test ideas on an internal click through rate dataset.
- Uncertainty (epistemic) estimation methods for the search ads predicted click through rate team.

2019 **Research Intern** Imagia, QC/CA.

- Developed methods for combining clinical notes with medical images to improve classification performance.
- Developed methods for localizing disease without explicit labels of where the disease is located in an image.

2014–2017 **Research Methods Specialist** Centre for Addiction and Mental Health, ON/CA.

- Biomarkers for vulnerable schizophrenia and Alzheimer's patients.
- Designed, built, and managed (team of 5) a data management platform 22-node compute cluster, and QA tools used by team of 20.
- Contributions to 2 successfully funded grants & 15 published papers.

2013–2014 **Research Assistant** York University, ON/CA.

- Development of a custom data pipeline platform.
- Mentored graduate students in neuroimaging analysis approaches, and contributed to 2 publications.

SKILLS

Python	Tensorflow, pytorch, numpy, pandas, scipy, scikit-learn.
Unix Administration	Certified system administrator by Linux Foundation (2016).
Other Languages	R, MATLAB, Java, C, SQL.

COMMUNITY SERVICE

2023-2025 **Area Chair** Meta Reviewing

Paper Adjudication for NeurIPS Datasets and Benchmarks Track.

2023 **Grant Reviewing** Health Data Nexus Dataset Grants

Reviewed 5 Proposals on the Collection of Healthcare-focused ML-ready datasets.

2014-2023 **Reviewing** Paper reviews for conferences and journals

Reviews for ICLR, NeurIPS Pre-registration in ML Workshop, FPI NeurIPS, Biological Psychiatry, MIDL, PNAS, & PLOS ONE.

2019 **Instruction** Deep Learning for Neuroscientists

A 1.5-3 hour course on the fundementals of deep learning for a non-CS audiance given at MAIN 2019 and Brainhack 2019.

2015–2016 **Instructor** Python for MRI Data Analysis

Designed and taught course on MRI data analysis using Numpy.

PUBLICATIONS

* = equal contributions.

Boussif O, Ezzine LN, Viviano JD, Koziarski M, Jain M, Malkin N, Bengio E, Assouel R, Bengio Y. Action abstractions for amortized sampling. ICLR, 2025.

Viviano JD*, Younis OG*, Choi S*, Schmidt V, Bengio Y, Lahlau S. torchgfn: A PyTorch GFlowNet library. arXiv, 2025.

Bertin P, Viviano JD, Tejada-Lapuerta A, Wang W, Bauer S, Theis FJ, Bengio Y. A scalable gene network model of regulatory dynamics in single cells. arXiv, 2025.

Delaunay P, Bouthillier X, Breuleux O, Ortiz-Gagné S, Bilaniuk O, Normandin F, Bergeron A, Carrez B, Alain G, Blanc S, Viviano JD, et al. Introducing Milabench: Benchmarking Accelerators for AI. arXiv, 2024.

Cohen JP, Viviano JD, Bertin P, Morrison P, Torabian P, Guarrera M, Lungren MP, Chaudhari A, Brooks R, Hashir M, Bertrand H. TorchXRayVision: A library of chest X-ray datasets and models. Medical Imaging with Deep Learning (MIDL), 2022.

Oliver LD, Hawco C, Viviano JD, Voineskos AN. From the Group to the Individual in Schizophrenia Spectrum Disorders: Biomarkers of Social Cognitive Impairments and Therapeutic Translation. Biological Psychiatry, 91(8), 699-708.

Tetteh E, Viviano JD, Bengio Y, Krueger D, Cohen JP. Multi-Domain Balanced Sampling Improves Out-of-Distribution Generalization of Chest X-ray Pathology Prediction Models. arXiv, 2021.

Cohen JP, Cao T, Viviano JD, Huang CW, Fralick M, Ghassemi M, Mamdani M, Greiner R, Bengio Y. Problems in the deployment of machine-learned models in health care. Canadian Medical Association Journal, 193(35), E1391-E1394.

Luccioni A, Viviano JD. What's in the Box? A Preliminary Analysis of Undesirable Content in the Common Crawl Corpus. The Joint Conference of the Association for Computational Linguistics and the International Joint Conference on Natural Language Processing (ACL-IJCNLP), 2021.

Viviano JD, Simpson B, Dutil F, Bengio Y, Cohen JP. Saliency is a Possible Red Herring When Diagnosing Poor Generalization. International Conference on Learning Representations (ICLR), 2021.

Viviano JD, Buchanan RW, Calarco N, Gold J, Foussias G, Bhagwat N, Stefanik L, Hawco C, Malhotra AL, Voineskos AN, for the SPINS group. 2018. Resting-state connectivity biomarkers of cognitive performance and social function in schizophrenia spectrum disorders and healthy controls. Biological Psychiatry. 84(9), 665-674.

Overton DJ, Bhagwat N, Viviano JD, Jacobs GR, Voineskos AN. Identifying psychosis spectrum youth using support vector machines and cerebral blood perfusion as measured by arterial spin labeled fMRI. NeuroImage: Clinical. 27, 102304.

Bhagwat N, Viviano JD, Voineskos AN, Chakravarty MM. 2018. Modeling and prediction of clinical symptom trajectories in Alzheimer's disease using longitudinal data. 2018. PLoS Computational Biology. 14(9), e1006376.

Spreng NR, Stevens WD, Viviano JD, Schacter D. 2016. Attenuated anticorrelation between the default and dorsal attention networks with aging: Evidence from task and rest. Neurobiology of Aging. 45, 149-160.

DeSimone K, Viviano JD, Schneider KA. 2015. Population receptive field estimation reveals new

retinotopic maps in human subcortex. Journal of Neuroscience, 35(27):9836-47.

Viviano JD, Schneider KA. 2015. Interhemispheric interactions of the human thalamic reticular nucleus. Journal of Neuroscience, 35(5):2026-32.

Viviano J, Klauer D, Olmos S, Viviano JD. Retrospective comparison of the George Gague™registration and the sibilant phoneme registration for constructing OSA oral appliances. CRANIO, 40(1), 5-13.

Lemire-Rodger S, Lam J, Viviano JD, WD Stevens, Spereng RN, Turner GR. 2019. Inhibit, switch, and update: a within-subject fMRI investigation of executive control. Neuropsychologia, 132, 107134.

Jacobs GR, Ameis SH, Ji JL, textcolorhighlightViviano JD, Dickie EW, Wheeler AL, Stojanovski S, Anticevic A, Voineskos AN. 2019. Developmentally divergent sexual dimorphism in the cortico-striatal-thalamic-cortical psychosis risk pathway. Neuropsychopharmacology, 44(9), 1649-1658.

Hawco C, Buchanan RW, Calarco N, Mulsant BH, textcolorhighlightViviano JD, Dickie EW, Argylean M, Gold JM, Iacoboni M, DeRosse P, Foussias G, Malhorta AK, Voineskos AN, for the SPINS group. 2019. Seperable and replicable neural strategies during social brain function in people with and without severe mental illness. American Journal of Psychiatry, 176(7), 521-530.

Stojanovski S, Felsky D, Viviano JD, Shahab S, Bangali R, Burton C, Devenyi GA, O'Donnell LJ, Szatmari P, Chakravarty MM, Ameis S, Schachar R, Voineskos AN, Wheeler AL. 2018. Polygenic risk and neural substrates of attention-deficit/hyperactivity disorder symptoms in youth with a history of mild traumatic brain injury. Biological Psychiatry. 85(5), 408-416.

Hawco C, Voineskos AN, Steeves J, Dickie EW, Viviano JD, Downar J, Blumberger D, Daskalakis ZJ. 2018. Spread of activity following TMS is related to intrinsic resting connectivity to the salience network: a concurrent TMS-fMRI study. Cortex. 108, 160-172.

paperChavez S, Viviano JD, Zamyadi M, Kingsley PB, Kochunov P, Strother S, Voineskos AN. 2018. A novel DTI-QA tool: automated metric extraction exploiting the sphericity of an agar filled phantom. Magnetic Resonance Imaging. 46, 28-39.

Hawco C, Viviano JD, Chavez S, Dickie EWE, Calarco N, Kochunov P, Argyelan M, Turner J, Malhortra AK, Buchanan RW, Voineskos AN. 2018. A longitudinal human phantom study of multi-center T1-weighted, DTI, and resting-state fMRI data. Psychiatric Research: Neuroimaging. June 9 (Online).

Dickie EW, Anticevic A, Smith DE, Coalson TS, Manogaran M, Calarco N, Viviano JD, Glasser MF, Van Essen DC, Voineskos AN. 2018. Ciftify: A framework for surface-based analysis of legacy MR acquisitions. Neuroimage, 197, 818-826.

Dickie EW, Ameis SH, Viviano JD, Smith DE, Calarco N, Shahab S, Voineskos AN. 2018. Personalized intrinsic network topography mapping and functional connectvitiy deficits in autism spectrum disorder. Biological Psychiatry. 84(4), 278-286.

Viviano JD, Park MTM, Voineskos AN, Chakravarty MM. 2018. Homology of functional connectivity and structural covariance between the human cerebellum and cortex. Publication abandoned.

Kochunov P*, Dickie EW*, Viviano JD*, Turner J, Kingsley PB, Jahanshad N, Thompson P, Ryan M, Fiermans E, Novikov D, Hong EL, Malhotra AK, Buchanan RW, Chavez S, Voineskos AN. 2017. Integration of routine QA data into mega-analysis may improve quality and sensitivity of multi-site diffusion tensor imaging studies. Human Brain Mapping. 39(2), 1015-1023.

Hawco C, Kovacevic N, Malhotra AK, Buchanan RW, Viviano JD, Iacoboni M, McIntosh AR, Voineskos AN. 2017. Neural activity while imitating emotional faces is related to both lower and higher-level social cognitive performance. Scientific Reports. 7, 1244.

Ameis SH, Lerch JP, Taylor M, Lee W, Viviano JD, Pipitone J, Nazeri A, Croarkin P, Voineskos A, Crosbie J, Brian J, Soreni N, Schachar R, Arnold P, Anagnostou E. 2016. A diffusion tensor imaging study in children

with ADHD, autism spectrum disorder, OCD, and matched controls: distinct and non-distinct white matter disruption and dimensional brain-behavior relationships. American Journal of Psychiatry. 173(12):1213-1222.

Wheeler AL, Felsky D, Viviano JD, Stojanovski S, Ameis SH, Szatmari P, Lerch JP, Chakravarty MM, Voineskos AN. 2016. BDNF and sex dependent effects on amygdala-cortical connectivity and depression risk in children and youth. 2017. Cerebral Cortex. 1-11.

McKetton L, Williams J, Viviano JD, Yücel YH, Gupta N, Schneider KA. 2015. High-resolution structural magnetic resonance imaging of the human subcortex in vivo and postmortem. Journal of Visualized Experiments, 106.

INVITED TALKS

2024 **Keynote Speaker** FACSS SciX

Could an AI Understand a Scientist?

2024 **Invited Speaker** Faculty of Pharmacy, University of Montreal

Machine Learning for Drug Discovery and Development.

2023 **Invited Speaker** Joint Genome Instuitute Annual User Meeting

Viviano JD. Considerations for Machine Learning-Aided Lab in the Loop Scientific Discovery.

2015 **Invited Speaker** Human Brain Mapping Data Workshop

Viviano JD, Chavez S, Pipitone JC, Voineskos AN. Tracking the quality of ongoing acquisitions.

SELECTED CONFERENCE TALKS, POSTERS & ABSTRACTS

Siddiqui S, Saperia S, Da Silva S, Jeffay E, Pipitone J, Viviano J, Zawadzki J, Wong A, Fervaha G, Agid O, Zakzanis K, Remington G, Voineskos A, Foussias G. 2017. Behavioral and neurobiological correlates of attention in schizophrenia in a virtual environment [Abstract]. *Schizophrenia Bulletin, 43, S42*.

Stevens WDD, Spreng RN, Viviano JD, Schacter DL. 2014. Age-related dedifferentiation of intrinsic functional connectivity both within and between the default and dorsal attention networks. *Society for Neuroscience*.

DeSimone K, Viviano JD, Schneider KA. 2013. Population receptive field estimation in the human subcortical nuclei. *Society for Neuroscience*.

Hawco C, Dickie EW, Viviano J, Voineskos AN. Clustering multiple task fMRI modalities reveals a positive to negative axis across participants. Organization for Human Brain Mapping, Singapore, June 18-21 2018.

Wheeler AL, Trossman R, Stojanovski S, Jacobs G, Stefanik L, Viviano J, Voineskos AN. Neurobiologically derived clusters differentiate youth based on internalizing symptom load. *American College of Neuropsychopharmacology*.

Overton D, Bhagwat N, Viviano JD, Voineskos AN. Identifying a psychosis spectrum disorder group using arterial spin-labeled fMRI and support vector machines. *Society for Biological Psychiatry*.

Bhagwat N, Patel S, Viviano JD, Voineskos AN, Chakravarty MM, and Alzheimer's Disease Neuroimaging Initiative. Modeling and prediciton of clinical symptom trajectories in Alzheimer's disease using longitudinal

data. *Human Brain Mapping*.

Trossman R, Stojanovski S, Viviano J, Voineskos A, Wheeler A. Internalizing Symptoms are Differentially Associated with Resting State Default Mode Connectivity in Youth with a History of Traumatic Brain Injury [Abstract]. *Society for Biological Psychiatry, 81(10), S245-S246*.

Stojanovski S, Felsky D, Viviano JD, Shahab S, Bangali R, Burton C, O'Donnell LJ, Szatmari P, Chakravarty MM, Ameis S, Schachar R, Voineskos AN, Wheeler AI. ADHD sumptoms in youth are differentially associated with polygentic risk and neural substrates if there is a history of traumatic brain injury [Abstract]. *Society for Biological Psychiatry, 81(10), S103*.

Shahab S, Dickie E, Viviano JD, Foussias G, Voineskos A. Altered Functional Organization in Schizophrenia. *Society for Biological Psychiatry, 81(10), S392*.

Hawco C, Voineskos AN, Steeves JKE, Dickie EW, Viviano JD, Daskalakis ZJ. Spread of Activity Following TMS is correlated with Intrinsic Resting Connectivity with the Target Region: A concurrent TMS-fMRI study [Abstract]. *Society for Biological Psychiatry, 81(10), S383*.

Hawco C, Voineskos AN, Steeves JKE, Dickie EW, Viviano JD, Daskalakis ZJ. Spread of Activity Following TMS is correlated with Intrinsic Resting Connectivity with the Target Region: A concurrent TMS-fMRI study. *Cognitive Neuroscience Society*.

Ameis S, Lerch J, Taylor M, Lee W, Viviano J, Pipitone J, Nazeri A, Croarkin P, Brian J, Crosbie J, Voineskos A, Soreni N, Schachar R, Szatmari P, Arnold P, Anagnostou E. 2015. Common and distinct white matter markers in children with attention-deficit/hyperactivity disorder, obsessive compulsive disorder and autism spectrum disorder [Abstract]. *Neuropsychopharmacology, 40, S292-S293*.

Wheeler A, Felsky D, Viviano J, Nazeri A, Lerch J, Chakravarty M, Voineskos A. 2015. The brain-derived neurotrophic factor val66met polymorphism is associated with altered amygdala-cortical structural covariance in adolescence [Abstract]. *Neuropsychopharmacology, 40, S288-S289*.

Viviano JD, Park MTM, Voineskos AN, Chakravarty MM. 2015. Structural and functional connectivity of the human cerebellum using anatomical cerebellar priors. *Human Brain Mapping*.

Stevenson RA, Brown-Lavoie S, Segers M, Bebko J, Stevens WD, Viviano J, Baum S, Ferber S, Barense MD, Wallace MT. 2014. Impaired neural processing efficiency of multisensory integration in autism spectrum disorders. *Society for Neuroscience*.

Viviano JD, Stevens WD, Schneider KA. 2014. A method for probing the resonance of neural populations using fMRI. *Lake Ontario Visionary Establishment*.

McKetton L, Viviano J, Schneider KA. 2013. Resolving the individual layers of the human lateral geniculate nucleus using high-resolution structural MRI [Abstract]. *Journal of Vision, 13(9): 554*.

Viviano JD, Schneider KA. 2013. Imaging the human visual thalamic reticular nucleus. *Society for Neuroscience*.

Chouinard PA, McLean AA, Sperandio I, Viviano J, Schneider KA, Goodale MA. 2013. Magnocellular and

parvocellular fMRI activation in separate subdivisions of the human lateral geniculate nucleus. *Canadian Neuroscience Meeting*.

Viviano JD, Schneider KA. 2013. Tremotopic mapping of the human thalamic reticular nucleus. *York University Centre for Vision Research Conference*.

DeSimone K, Viviano J, Schneider KA. 2013. Population receptive field estimation in the human lateral geniculate nucleus. *Human Brain Mapping*.

Viviano JD, Schneider KA. 2012. Flicker modulation isolates the magnocellular layers of the human lateral geniculate nucleus. *Society for Neuroscience*.

Viviano JD, DeSimone K, Schneider KA. 2012. Intrinsic functional connectivity of the human lateral geniculate nucleus [Abstract]. *Journal of Vision, 12(9): 382*.

TEACHING ENGAGEMENTS

2014 **Tutorial Leader** Genetics, BIOL 2040

Taught intro-level genetics and marked assignments.

2013 **Mark Compiler** Introduction to Biology, BIOL 1000

Automated this position using Python.

2012–2013 **Tutorial Leader** Mind and Brain, NATS 1860

Led discussions about cognitive science, psychology, and neuroscience with non-science majors.

2012–2014 **Tutorial Leader** Biology of Sex, NATS 1660

Taught basic genetics and cell biology to non-science majors.

2011–2012 **Tutorial Leader** The Living Body, NATS 1610

Taught basic physiology to non-science majors.

2011 **Tutorial Leader** Introduction to Biology, BIOL 1000

Taught intro-level biology, led labs, and marked full-length reports.

2011 **Tutorial Leader** Statistics for Biologists, BIOL 2060

Taught intro-level statistics and marked assignments.