Imperial College London

BRIAN M. SCHILDER

Sc.B., M.Phil.
Curriculum Vitae

PhD Candidate
UK Dementia Research Institute
Neurogenomics Lab, Department of Brain Sciences
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CONTACT & PROFILES

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Lab: neurogenomics.co.uk

EDUCATION

The George Washington University (Washington, DC) 2017
- Master of Philosophy – Human Paleobiology, focus on *Evolutionary Neuroscience and Genomics*

Brown University (Providence, RI) 2011
- Bachelor of Science – Cognitive Neuroscience, focus on *Neurological Diseases and Disorders*

CORE QUALIFICATIONS

- **Programming**: Regularly develops automated high-performance computing pipelines to efficiently filter, analyze and visualize big data. Proficient in multiple languages and toolsets: Python (e.g. sklearn, tensorflow, Keras), R (e.g. Bioconductor, Monocle, WGCNA), Shell, HTML, CSS, Javascript (e.g. Three.js, D3), MongoDB, SQL, etc.
- **Research**: 11+ years of highly multidisciplinary research experience including neuroscience, systems biology, bioinformatics, machine learning, multi-omics, biomedicine, phylogenetics, biological anthropology, cognitive science and statistics.
- **Writing**: Strong writing skills as evidenced by 9 peer-reviewed scientific publications, 15 international conference posters and 5 research grants (~$70,000 since 2016).
- **Management**: Capable of coordinating multiple independent projects at once (see experience as Lab Manager) with researchers of varying degrees of education and research experience.
- **Training**: Able to teach a variety of skills/topics (programming, bioinformatics, neuroscience, etc.) in both educational (5-time teaching assistant, mentor of undergraduate research projects) and practical environments (trained undergraduates, peers, colleagues and superiors in the respective methodologies of three different labs).
- **Communication**: Has developed effective communication skills with experts and non-experts through numerous conferences and departmental presentations, blog articles and 10+ science outreach programs since 2009.

ADDITIONAL SKILLS

- Able to rapidly and reproducibly evaluate, preprocess and analyze completely novel datasets regardless of domain.
- Highly effective and engaging research presentation skills for a wide range of audience backgrounds and expertise.
- Creative and independent generation of novel research hypotheses, existing resource utilization and study design.
- Capable of handling multiple independent research projects simultaneously.
- Has developed and continues to grow a diverse, multi-disciplinary and international collaborative network.

GRADUATE RESEARCH

The evolution of the hippocampus and adult neurogenesis: novel insights into the origins of human memory
Summary: The hippocampus subserves long-term memory and spatial navigation in many species, but only in humans does it additionally mediate episodic memory and imagination. By investigating the evolution of the hippocampus and adult hippocampal neurogenesis across primates at the levels of neuroanatomy, whole-transcriptome gene expression, and genotype, I sought to elucidate the neurobiological basis underlying human-specific cognitive abilities as well as our unique vulnerability to hippocampus-degrading neurological diseases.

PUBLICATIONS

1. C Moon, **BM Schilder**, T Raj, K-l Huang, (2021) Phenome-wide and eQTL Associations of COVID-19 Genetic Risk Loci, *ISCIENCE*, doi: https://doi.org/10.1016/ j.isci.2021.102550.
2. G Snijders, K de Paiva Lopes, J Humphrey, A Allan, M Sneeboer, E Navarro, **BM Schilder**, et al. (2021) 'Genetic Effects on Human Microglia Transcriptome in Neuropsychiatric Diseases'. *Biological Psychiatry*, 89, no. 9: S84–85. https://doi.org/10.1016/j.biopsych.2021.02.225.
3. N Mullins, AJ Forstner, KS O'Connell, B Coombes, JRI Coleman…**BM Schilder**… et al. (2020) Genome-Wide Association Study of over 40,000 Bipolar Disorder Cases Provides Novel Biological Insights. *medRxiv (accepted at Nature Genetics on 12/22/2020)*, https://doi.org/10.1101/2020.09.17.20187054.
4. Ramdhani, E Navarro, E Udine, AG Efthymiou, **BM Schilder**, M Parks, A Goate, T Raj (2020). Tensor decomposition of stimulated monocyte and macrophage gene expression profiles identifies neurodegenerative disease-specific trans-eQTLs. *PLOS Genetics*, 16 (9), e1008549, https://doi.org/10.1101/499509
5. **BM Schilder**, P Hof, H Petry (2019). Evolutionary shifts dramatically reorganized the human hippocampal complex. *Journal of Comparative Neurology*, https://doi.org/10.1002/cne.24822
6. D Clarke, L Wang, A Jones, M Wojciechowicz, D Torre, K Jagodnik, S Jenkins, P McQuilton, Z Flamholz, M Silverstein, **BM Schilder**…A Ma'ayan (2019) FAIRshake: Toolkit to Evaluate the Findability, Accessibility, Interoperability, and Reusability of Research Digital Resources. ***Chosen as 'Featured Frontmatter' article in Cell Systems***, 9, https://doi.org/10.1016/j.cels.2019.09.011
7. A Lachmann, **BM Schilder**, ML Wojciechowicz, D Torre, MV Kuleshov, AB Keenan, A Ma'ayan (2019). Geneshot: search engine for ranking genes from arbitrary text queries. *Nucleic Acids Research*, 1–7, https://doi.org/10.1093/nar/gkz393
8. DJB Clarke, MV Kuleshov, **BM Schilder**, D Torre, ME Duffy, AB Keenan, A Lachmann, AS Feldmann, GW Gundersen, MC Silverstein, Z Wang (2018) eXpression2Kinases (X2K) Web: linking expression signatures to upstream cell signaling networks. *Nucleic Acids Research*, 46 (W1), pW171-W179 https://doi.org/10.1093/nar/gky458
9. F Subiaul, L Zimmerman, E Renner, **BM Schilder**, R Barr (2015) Defining elemental imitation mechanisms: A comparison of cognitive and motor-spatial imitation learning across object- and computer-based tasks. *Journal of Cognition and Development*, 17 (2), p221-243, https://doi.org/10.1080/15248372.2015.1053483
10. KA Phillips, MK Hambright, K Hewes, **BM Schilder**, CN Ross, SD Tardif (2015) Take the monkey and run. *Journal of Neuroscience Methods*, *248*, p27–31. http://doi.org/10.1016/j.jneumeth.2015.03.023
11. F Subiaul, EM Patterson, **BM Schilder**, E Renner, R Barr (2014) Becoming a high-fidelity - super - imitator: what are the contributions of social and individual learning? *Developmental Science*, 18 (6), p1025-1035, http://doi.org/10.1111/desc.12276
12. F Subiaul, **BM Schilder** (2014) Working memory constraints on imitation and emulation. *Journal of Experimental Child Psychology*, 128, p190-200, http://doi.org/10.1016/j.jecp.2014.07.005

PREPRINTS

1. E Navarro, E Udine, K de Paiva Lopes, M Parks, G Riboldi, **BM Schilder**…T Raj (2020) Discordant transcriptional signatures of mitochondrial genes in Parkinson's disease human myeloid cells. *bioRxiv*, https://doi.org/10.1101/2020.07.20.212407
2. **BM Schilder**, J Humphrey, and T Raj (2020) *echolocatoR*: An Automated End-to-End Statistical and Functional Genomic Fine-Mapping Pipeline. *bioRxiv*, 0–8. https://doi.org/10.1101/2020.10.22.351221.
3. **BM Schilder** and T Raj (2020) Fine-Mapping of Parkinson's Disease Susceptibility Loci Identifies Putative Causal Variants. *bioRxiv*, 0–30. https://doi.org/10.1101/2020.10.22.340158.

ACKNOWLEDGEMENTS

1. O Weissbrod…AL Price. Functionally-informed fine-mapping and polygenic localization of complex trait heritability *Nature Genetics,* https://doi.org/10.1038/s41588-020-00735-5
2. N Kerimov…K Alassoo. (2020) eQTL Catalogue: a compendium of uniformly processed human gene expression and splicing QTLs. *bioRxiv*, doi: https://doi.org/10.1101/2020.01.29.924266
3. M van Vugt, P Simen, L Nystrom, P Holmes, J Cohen (2012) EEG oscillations reveal neural correlates of evidence accumulation. *Frontiers in Decision Neuroscience*, 6(106), 1-13. https://doi.org/10.3389/fnins.2012.00106
4. M van Vugt, P Simen, J Cohen (2011) Trial-by-trial adaptation of decision making performance: a model-based EEG analysis. *Interdisciplinary Perspectives on Cognition, Education, and the Brain, Hanse Studies*, Vol. 7. Oldenburg: BIS-Verlag

INVITED REVIEWERSHIPS

1. MJ van Essen et al. (2020) Deconstructing cerebellar development cell by cell. *PLOS Genetics*, 16, e1008630
2. MR O'Connor (2019) Wayfinding: The science and mystery of how humans navigate the world. *St. Martin's Press* (book). ISBN-13: 978-1250096968

INVITED TALKS

- Laboratory of Neurogenetics Friday Workshop, National Institute on Aging, National Institutes of Health (2020) Statistical and functional genetic fine-mapping across multiple disease.
- Neurogenomics Seminar, UK Dementia Research Institute, Imperial College London (2020) Automated consensus fine-mapping of neurological disorder genomics

CONFERENCE TALKS

- London Genetic Network (2020) Automated genetic fine-mapping of neurological disorders.
- American Society of Human Genetics (2019) Parkinson's disease derived monocytes show alteration in the phago-lysosomal pathway. *Co-contributor.*
- Marmoset Social – Satellite event at the Society for Neuroscience (2016)
- JB Johnston Club for Evolutionary Neuroscience (2014, 2016)

CO-AUTHORED CONFERENCE POSTERS

1. K Murphy, **BM Schilder**, N Skene (2020) Cell-type-specific reconstruction of primate evolution from genomic positive selection. *Imperial College London.*
2. **BM Schilder**, T Raj (2019) Automated genetic and functional fine-mapping of Parkinson's Disease Loci. *American Society of Human Genetics.*
3. E Udine, E Navarro, M Parks, G Riboldi, K Lopes, **BM Schilder**, T Sikder, K Watkins, M Zhang, D Raymond, S Elango, E Wieder, S Simon, S Bressman, J Crary, S Frucht, R Saunders-Pullman, T Raj. (2019) Parkinson's disease derived monocytes show alteration in the phago-lysosomal pathway. *American Society of Human Genetics*.
4. **BM Schilder**, A Lachmann, M Kuleshov, A Ma'ayan (2018) Learning X2K: Parameter Optimization via Genetic Algorithms to Calibrate the Expression2Kinases Pipeline. *Illuminating the Druggable Genome.*
5. **BM Schilder**, A Lachmann, M Kuleshov, A Ma'ayan (2018) Learning X2K: Parameter Optimization via Genetic Algorithms to Calibrate the Expression2Kinases Pipeline. *Big Data 2 Knowledge - Library of Integrated Network-Based Cellular Signatures.*
6. **BM Schilder**, BJ Bradley, CC Sherwood (2017) The evolution of the human hippocampus and neuroplasticity. *Association for American Physical Anthropologists*.
7. **BM Schilder**, BJ Bradley, CC Sherwood (2016) The molecular evolution of the primate hippocampus. *Society for Neuroscience*.
8. KA Phillips, MK Hambright, K Hewes, **BM Schilder**, B Jagessar, B t'Hart, SD Tardif (2015) Effects of exercise on disease progression and cognition in the marmoset EAE model. *JB Johnston Club for Evolutionary Neuroscience.*
9. **BM Schilder**, WA Barr, R Bobe, CC Sherwood (2015) The Effects of Climatic Trends, Variability, and Rates of Change On Mammalian Brain Evolution. *Association for American Physical Anthropologists.*
10. E Renner, **BM Schilder**, F Subiaul (2015) Individual, Observational, and Imitation Learning in Orangutans and Children. *Association for American Physical Anthropologists.*
11. A Gokhale, **BM Schilder**, F Subiaul (2014) The helper hinderer task revisited: an infant eye tracking study. *The George Washington University Research Day.*
12. **BM Schilder**, O Adeyo (2013) Dendritic morphology of pyramidal neurons across the visual stream: A direct comparison of chimpanzees and humans. *Society for Neuroscience.*
13. S Bianchi, T Duka, G Muntane, **BM Schilder**, CD Stimpson, WD Hopkins (2013) The striatum in the evolution of learned vocalizations: Understanding the neurobiological precursors to human speech using a chimpanzee model. *Society for Neuroscience.*
14. L Zimmerman, N Brito, C Mendelson, R Barr, E Renner, **BM Schilder**, F Subiaul (2013) Imitation & emulation in a novel box task. *Association for Psychological Science.*
15. R Barr, F Subiaul, L Zimmerman, L Renner, **BM Schilder**, C Mendelson, L Golojuch (2013) A study of imitation and working memory in 2- to 4- year-olds. *Association for Psychological Science.*
16. J Miller, **BM Schilder**, L Peizer, F Subiaul (2013) The impact of wealth on sharing preferences in children. *Child Development Society.*

BIOINFORMATICS TOOLS

1. **echolocatoR Fine-mapping Portal**: Access to interactive plots and fine-mapping results across many GWAS/QTL datasets using *echolocatoR*. https://rajlab.shinyapps.io/Fine_Mapping_Shiny
2. **echolocatoR**: R package for end-to-end statistical and functional fine-mapping with extensive dataset access. ASHG conference poster listing: http://bit.ly/ashg2019finemap
3. **catalogueR**: R package for rapid API-access and colocalization of summary statistics from eQTL Catalogue. https://github.com/RajLabMSSM/catalogueR
4. **ggLocusZoom**: R package for LocusZoom-inspired GWAS/QTL visualization, with API access to LD panels. https://github.com/RajLabMSSM/ggLocusZoom
5. **Tensor Decomposition ShinyApp**: Interactive application to explore and download all results and plots from Ramdhani et al. (*preprint*). https://rajlab.shinyapps.io/Tensor_myeloid
6. **Geneshot**: Flexible tool to identify genes associated with any biomedical term and to predict novel target genes. http://amp.pharm.mssm.edu/geneshot
7. **eXpression 2 Kinases (X2K) Web**: Automated computational pipeline to infer kinase regulators from weighted or unweighted gene lists. http://amp.pharm.mssm.edu/X2K

WEB DEVELOPMENT

1. Official website for the laboratory of Dr. Towfique Raj (Mount Sinai): http://www.rajlab.org
2. My professional website: https://bschilder.github.io/BMSchilder
3. Interactive code, results and visualization for the manuscript "*Evolutionary selective pressures dramatically expanded and reorganized the human hippocampal complex*": https://github.com/bschilder/Hippo_Eco
4. Official website for 120/80 MKTG (digital healthcare marketing company): https://www.120over80mktg.com

MEDIA COVERAGE

1. **The Future of AI at the Hasso Plattner Institute for Digital Health at Mount Sinai**: https://youtu.be/tBKHWQsCANE?t=44
2. **Mount Sinai: Fighting Neurodegenerative Disorders**: https://youtu.be/2TcBEiUtIy4
3. **Geneshot: Piercing the Literature to Identify and Predict Relevant Genes**: https://info.hsls.pitt.edu/updatereport/2019/july-2019/geneshot-piercing-the-literature-to-identify-and-predict-relevant-genes
4. **Mount Sinai Faculty Spotlight: Ma'ayan Lab**: https://youtu.be/tB3BgSL4rXE

RESEARCH EXPERIENCE

Raj Laboratory – Neuroscience, Genetics & Genomics (Bioinformatician II) 11/2018 – Present
Icahn School of Medicine at Mount Sinai, New York, NY

- Developed machine learning systems to integrate large-scale multi-omics datasets (e.g. whole-genome sequencing, bulk and single-cell RNA-seq, epigenomics, clinical data) to uncover the molecular mechanisms underlying neurodegenerative diseases (e.g. Alzheimer's, Parkinson's, ALS).
- Computationally identified specific disease-causal variants, pathways and cell-types for subsequent functional wet lab validation (e.g. CRISPR-cas9 editing in patient-derived cell cultures, iPSCs and cerebral organoids).

Ma'ayan Laboratory – Computational Systems Biology (Bioinformatician II) 10/2017 – 11/2018
Icahn School of Medicine at Mount Sinai, New York, NY

- Integrated and analyzed large-scale genomic and biomedical data (e.g. Python, R, JavaScript).
- Wrote evolutionary algorithm from scratch to optimize gene network kinase regulator prediction algorithm (eXpression2Kinases).
- Developed and deployed computational tools, software, databases and web applications for basic and clinical research, culminating in 3 peer-reviewed publications so far (see above).

Systems Genetics in Neurodegeneration (Participant) 08/2017 – 09/2017
Technische Universität Dresden / eMed, Frauenchiemsee, Germany

- Attended lectures and extended skills in extraction and analysis of big data from biomedical and neurogenomic resources.
- Developed, performed and wrote manuscript for collaborative bioinformatics research project in less than one week.

Community Research Education and Engagement for Data Science (Participant) 06/2016
Icahn School for Medicine at Mount Sinai, New York, NY

- Intensive summer school in high-performance computing, coding, genome database utilization and bioinformatics methods including transcriptomics and genetic association testing.

Evolution of the Hippocampus and Adult Neurogenesis Research (Graduate Student) 08/2013 – 08/2017
The George Washington University, Washington, DC
- Researched the evolution of human-specific cognitive abilities and neurological disease susceptibilities (e.g. Alzheimer's).
- Focused on neuroanatomical, transcriptomic and genomic evolution of the human hippocampus and memory.

Laboratory for Evolutionary Neuroanatomy (Research Assistant) 10/2011 – 08/2013
Department of Anthropology, The George Washington University, Washington, DC
- Performed dissection, histology, microscopy and quantitative stereology in post-mortem primate brain tissues.
- Led project comparing morphology of pyramidal neurons in the ventral visual system of humans to chimpanzees.
- Trained junior and senior personnel on lab protocols.

Social Cognition Laboratory (Senior Lab Manager) 08/2011 – 08/2013
Department of Speech, Language & Hearing Sciences, The George Washington University, Washington, DC
- Organized and trained dozens of undergraduates to conduct weekly cognitive development research; designed and/or directly contributed to over 15 research projects in two years.

The Effects of Exercise on Marmoset Models of Multiple Sclerosis (Collaborator) 08/2014 – 08/2017
Southwestern National Primate Research Center, San Antonio, TX
- Under Dr. Kimberley Phillips (Trinity University, Dept. Neuroscience), investigated the neurobiological mechanisms underlying the ameliorating effects of exercise on relapse-remitting Multiple Sclerosis.

Koobi Fora Field School (Teaching Assistant & Project Leader) 06/2014 – 08/2014
Ileret, Kenya
- Served as Teaching Assistant the directorship of Dr. David Braun excavating Lower Paleolithic hominin sites (*Homo*, *Paranthropus*).
- As Project Leader, investigated the running biomechanics of local Daasanach tribespeople while mentoring undergraduate students.

Field-school in Paleoanthropology and Paleolithic Archaeology (Volunteer Researcher) 06/2012 – 07/2012
Mala Balanica, Velika Balanica, & Pešturina sites, Sićevo, Serbia
- Under the directorship of Drs. Mirjana Roksandic (U. Winnipeg) and Dušan Mihailovic (U. Belgrade) volunteered with an international team to excavate Paleolithic fossils and tools (*H. heidelbergensis, H. neanderthalensis*).

Field School for Quaternary Paleoanthropology and Prehistory (Volunteer Researcher) 07/2011
Universidad de Murcia, Murcia, Spain
- Under the directorship of Dr. Michael Walker (U. Murcia) excavated Paleolithic fossils and tools from Cueva Negra (*H. heidelbergensis*) and Sima de las Palomas (*H. neanderthalensis*) with an international research team.

American Museum of Natural History (Volunteer Research Intern) 06/2011 – 08/2011
New York, NY
- Contributed to paleoanthropological research on primate fossils using 3D morphometry imaging equipment including Minolta, Microscribe and CT.

Princeton Neuroscience Institute Internship (Research Intern) 06/2010 – 08/2010
Princeton University, Princeton, NJ
- As Research Intern investigated the neural basis of decision-making in humans in the lab of Dr. Jonathan Cohen and under the direct mentorship of Dr. Marieke van Vugt. Recruited participants, recorded EEG and analyzed data in MATLAB.

Undergraduate Course Research (Student) 09/2009 – 05/2010
Dept. of Psychology, Brown University, Providence, RI
- *Experimental Analysis of Animal Behavior & Cognition:* Conducted various operant conditioning experiments on rats. Gained experience in animal behavioral training, data collection, and data analysis in MATLAB.
- *Laboratory in Genes and Behavior:* Tested transgenic mice with modified N-type voltage-gated calcium channel subunits in a battery of cognitive and sensorimotor tasks. Results were published by Prof. Burwell.

TEACHING EXPERIENCE

2018 **Research Co-Mentor** *(The Icahn School of Medicine at Mount Sinai)*
- Co-mentored summer intern in the 'Summer Research Training Program in Biomedical Big Data Science' for her research project 'ChEA3: Transcription Factor Enrichment Analysis Portal'.

2018 **Guest Lecturer** *(The Icahn School of Medicine at Mount Sinai)*
- Lectured on data visualization in Python and Jupyter notebooks in the PhD/MD course

'Programming for Big Data Biomedicine'.

2016-2017 **Research Mentor** *(The George Washington University, DC)*
- Mentored undergraduate student on project quantifying differences in adult hippocampal neurogenesis between marmoset models of multiple sclerosis and controls.

2015 **Teaching Assistant: Human Brain Evolution** *(The George Washington University, DC)*
- Guest lectured, graded all assignments and exams, and provided additional educational support during office hours.

2014 **Teaching Assistant: Biological Psychology** *(The George Washington University, DC)*
- Led undergraduates in article discussions, graded all assignments and exams, and provided additional educational support during office hours.

2013-2014 **Teaching Assistant: Biological Anthropology** *(The George Washington University, DC)*
- Led undergraduate students in two, 2-hour lab sessions per week, graded lab assignments and exams, and provided additional educational support during office hours.

2013 **Research Mentor** *(The George Washington University, DC)*
- Mentored undergraduate student in Psychology Department for her senior research thesis on infant cognitive development using eye tracking paradigm.

2011-2013 **Protocol Training** *(The George Washington University, DC)*
- Trained undergraduate, graduate, and post-doctoral researchers in Social Cognition Lab and Lab for Evolutionary Neuroscience in a variety of methodological research protocols.

EXTRACURRICULAR

Competitive Running Career
- Committed to over eight continuous years of varsity and Division I cross country, winter track, and spring track throughout high school and college. Year-round, daily training and traveling to weekly competitions necessitated a dedicated and regimented lifestyle in order to succeed as a student-athlete. To this day, long-distance running remains a passion of mine and I enjoy training for ultra-marathons in my free time. This passion, work ethic and self-insight have carried over to all aspects of my life, including my career as a researcher.

Music Production
- Writing, recording, producing and performing original music.