



# BRIAN M SCHILDER, PHD

Passionately pursuing transdisciplinary research to advance human health and knowledge.

- Below are selected subsets of the [full CV](#). -

## EDUCATION

2024



**Imperial College London / The Alan Turing Institute**

PhD; Computational Genomics & Machine Learning

📍 London, UK

**Thesis:** Multi-omic medicine: dissecting the cell type-specific and pleiotropic mechanisms underlying disease genomics at scale

2017



**The George Washington University / Georgetown University**

MPhil; Comparative Neuroscience & Genomics

📍 Washington, DC, USA

**Thesis:** The evolution of the hippocampus and adult neurogenesis: Novel insights into the origins of human memory

2011



**Brown University / Princeton University**

ScB; Neurological Diseases & Disorders

📍 Providence, RI, USA

## CORE SKILLS

### Research

**15+** years of deep expertise in a genomics, AI, evolutionary biology and biomedicine. Strategically fuses concepts and methods across multiple domains.

- **Publication record:** **23** publications, **8** preprints and **13** awarded grants.
- **Reproducibility:** Global leader in promoting and enabling reproducible scientific practices. 📄 Writes 100% reproducible manuscripts programmatically. 📄
- **Bioinformatics:** Created **45** Python and R packages to address key challenges in biological research.
- **High-performance computing:** Highly parallelised analyses and AI model training (CPUs and GPUs).
- **Web development:** **6+** websites, web apps, and interactive reports.

## CONTACT

✉ [brian\\_schilder \[at\] alumni.brown.edu](mailto:brian_schilder[at]alumni.brown.edu)

📞 US

+1 908-268-9859

📞 UK

+44 073-0653-7736

🌐 LinkedIn

🆔 ORCID

🔍 Google Scholar

🐙 GitHub

🐦 Twitter

📺 YouTube

🌐 Personal Website

🌐 Lab Website

## SUMMARY

📅 **15+** years of research

📄 **23** publications

📄 **8** preprints

🔧 **41** software packages

🗄 **11** databases & apps

🗣 **23** talks

👤 **13+** years of teaching & team management

## TABLE OF CONTENTS

🎓 Education

✓ Skills

📄 Publications

📄 Preprints

📅 Experience




💰 Grants

📅 Updated Jun-29-2024

📄 Made with [autoCV](#)

## AI & Machine Learning

Proficient in developing and deploying AI/ML models (PyTorch, tensorflow, Keras, sklearn and H2O) to solve complex biological problems. Applied examples include:

- **Causal variant effect prediction:** Used functional impact predictions from DNA sequence models (DeepSEA, Basenji, IMPACT) to validate SNPs prioritised with Bayesian fine-mapping. 
- **Foundation models:** Used transformer trained on >36M cells and protein sequence embeddings to uncover cell type-specific mechanisms of disease.
- **LLM knowledge extraction:** Developed framework to extract quantitative metrics of phenotype severity from GPT-4. 
- **Disease genomics embeddings:** Developed VAE/graph models to reveal joint latent representation of genomic signatures across all diseases and phenotypes.
- **NLP:** Created a suite of proprietary Python packages for advanced topic modelling of the PubMed literature to provide business intelligence to the world's largest digital health, biotech, and pharma companies (as a consultant with [120/80 Group](#)).
- **Tensor decomposition:** Applied multi-condition factorisation to efficiently discover neurodegeneration-relevant *trans*-eQTLs 

## Project Management

Efficient management strategies to define objectives, track progress and coordinate diverse teams.

- **Documentation:** Defines objectives and tracks progress with GitHub Projects. Includes useful documentation in Issues, inline code and shareable reports.
- **Version control:** Extensive and daily use of GitHub, containers (*Docker*, *Singularity*, *virtual machines*), environments (*conda*) and pipelines (*Nextflow*).
- **Team management:** [Led numerous collaborative research projects](#) and [supervised researchers at various career stages](#).

## Soft skills

Advances science through effective problem formulation, collaboration and communication.





- **Problem formulation:** Rapid hypothesis generation, project design, and creative problem solving.
- **Communication:** Clear and concise distillation of complex results to a variety of audiences. Presented **25** conference posters.
- **Collaboration:** Diverse and global collaborative networking.



## PUBLICATIONS

- 2023 • **rworkflows: automating reproducible practices for the R community**  
*Nature Communications* (2023) 15(149); <https://doi.org/10.1038/s41467-023-44484-5>  
**BM Schilder**, AE Murphy, NG Skene  
 **News**  
- [Featured in Nature Communications Editors' Highlights](#)
- 2023 • **Artificial intelligence for neurodegenerative experimental models**  
*Alzheimer's & Dementia* (2023) <http://doi.org/10.1002/alz.13479>  
SJ Marzi, **BM Schilder**, A Nott, C Sala Frigerio, S Willaime-Morawek, M Bucholc, DP Hanger, C James, PA Lewis, I Lourida, W Noble, F Rodriguez-Algarra, JA Sharif, M Tsalenchuk, LM Winchester, U Yaman, Z Yao, DEMON Network, JM Ranson, DJ Llewellyn
- 2023 • **Artificial intelligence for dementia genetics and omics**  
*Alzheimer's & Dementia* (2023) <http://doi.org/10.1002/alz.13427>  
C Bettencourt, NG Skene, S Bandres-Ciga, E Anderson, LM Winchester, IF Foote, J Schwartzentruber, JA Botia, M Nalls, A Singleton, **BM Schilder**, J Humphrey, SJ Marzi, CE Toomey, A Al Kleifat, EL Harshfield, V Garfield, C Sandor, S Keat, S Tamburin, C Sala Frigerio, I Lourida, DEMON Network, JM Ranson, DJ Llewellyn
- 2023 • **Artificial intelligence for dementia research methods optimization**  
*Alzheimer's & Dementia* (2023) <http://doi.org/10.1002/alz.13441>  
M Bucholc, C James, A Al Kleifat, A Badhwar, N Clarke, A Dehsarvi, CR Madan, SJ Marzi, C Shand, **BM Schilder**, S Tamburin, HM Tantiangco, I Lourida, DJ Llewellyn, JM Ranson
- 2023 • **EpiCompare: R package for the comparison and quality control of epigenomic peak files**  
*Bioinformatics Advances* (2023) 13(1):vbad049; <https://doi.org/10.1093/bioadv/vbad049>  
S Choi, **BM Schilder**, L Abbasova, AE Murphy, NG Skene


- 2022 • **Dissecting the Shared Genetic Architecture of Suicide Attempt, Psychiatric Disorders, and Known Risk Factors**  
*Biological Psychiatry* (2022) 91(3):313-327; <https://doi.org/10.1016/j.biopsych.2021.05.029>  
 N Mullins, J Kang, AI Campos,...**BM Schilder**, et al.
- 2022 • **Genetic analysis of the human microglial transcriptome across brain regions, aging and disease pathologies**  
*Nature Genetics* (2022) <https://doi.org/10.1038/s41588-021-00976-y>  
 K de Paiva Lopes, G JL Snijders, J Humphrey, A Allan, M Sneeboer, E Navarro, **BM Schilder**...T Raj  
 **News**  
 - Microglial transcriptomics meets genetics: new disease leads (Nature Reviews Neurology, 2022)  
 - Mighty MiGA: Microglial Genomic Atlas Zeros in on Causal AD Risk Variants (ALZFORUM, 2022)  
 - Can a Human Microglial Atlas Guide Brain Disorder Research? (Mount Sinai Health System, 2022)  
 - Polygenic Scores Paint Microglia as Culprits in Alzheimer's (ALZFORUM, 2021)
- 2021 • **Multi-omic insights into Parkinson's Disease: From genetic associations to functional mechanisms**  
*Neurobiology of Disease* (2021) 105580; <https://doi.org/10.1016/j.nbd.2021.105580>  
**BM Schilder**, E Navarro, T Raj
- 2021 • **Fine-Mapping of Parkinson's Disease Susceptibility Loci Identifies Putative Causal Variants**  
*Human Molecular Genetics* (2021) ddab294; <https://doi.org/10.1093/hmg/ddab294>  
**BM Schilder**, T Raj
- 2021 • **echolocator: An Automated End-to-End Statistical and Functional Genomic Fine-Mapping Pipeline**  
*Bioinformatics* (2021) btab658; <https://doi.org/10.1093/bioinformatics/btab658>  
**BM Schilder**, J Humphrey, T Raj
- 2021 • **MungeSumstats: A Bioconductor Package for the Standardisation and Quality Control of Many GWAS Summary Statistics**  
*Bioinformatics* (2021) 37(23):4593-4596; <https://doi.org/10.1093/bioinformatics/btab665>  
 A Murphy, **BM Schilder**, NG Skene
- 2021 • **Dysregulation of mitochondrial and proteo-lysosomal genes in Parkinson's disease myeloid cells**  
*Nature Genetics* (2021) <https://doi.org/10.1101/2020.07.20.212407>  
 E Navarro, E Udine, K de Paiva Lopes, M Parks, G Riboldi, **BM Schilder**...T Raj  
 **News**  
 - Mount Sinai: Fighting Neurodegenerative Disorders (Mount Sinai Health System, 2019)
- 2021 • **Phenome-wide and eQTL Associations of COVID-19 Genetic Risk Loci**  
*iScience* (2021) <https://doi.org/10.1016/j.isci.2021.102550>  
 C Moon, **BM Schilder**, T Raj, K-I Huang
- 2021 • **Genome-Wide Association Study of over 40,000 Bipolar Disorder Cases Provides Novel Biological Insights**  
*Nature Genetics* (2021) 53:817-829; <https://doi.org/10.1038/s41588-021-00857-4>  
 N Mullins, AJ Forstner, KS O'Connell, B Coombes, JRI Coleman...**BM Schilder**... et al.  
 **News**  
 - Researchers identify 64 regions of the genome that increase risk for bipolar disorder (EurekAlert, 2021)  
 - Largest Bipolar Disorder Genetics Study Doubles Genetic Risk Factors (Nordic Society of Human Genetics and Precision Medicine, 2021)
- 2020 • **Tensor decomposition of stimulated monocyte and macrophage gene expression profiles identifies neurodegenerative disease-specific trans-eQTLs**  
*PLOS Genetics* (2020) 16(9):e1008549; <https://doi.org/10.1371/journal.pgen.1008549>  
 S Ramdhani, E Navarro, E Udine, AG Efthymiou, **BM Schilder**, M Parks, A Goate, T Raj

- 2019 • **Evolutionary shifts dramatically reorganized the human hippocampal complex**  
*Journal of Comparative Neurology* (2019) 528(17):3143-3170; <https://doi.org/10.1002/cne.24822>  
 BM Schilder, HM Petry, PR Hof
- 2019 • **FAIRshake: Toolkit to Evaluate the Findability, Accessibility, Interoperability, and Reusability of Research Digital Resources**  
*Cell Systems* (2019) 9; <https://doi.org/10.1016/j.cels.2019.09.011>  
 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  
 **News**  
 - Chosen as 'Featured Frontmatter' article in *Cell Systems*
- 2019 • **Geneshot: search engine for ranking genes from arbitrary text queries**  
*Nucleic Acids Research* (2019) 47(W1):W571-W577; <https://doi.org/10.1093/nar/gkz393>  
 A Lachmann, BM Schilder, ML Wojciechowicz, D Torre, MV Kuleshov, AB Keenan, A Ma'ayan  
 **News**  
 - Geneshot: Piercing the Literature to Identify and Predict Relevant Genes (University of Pittsburgh Health Sciences Library System Update, 2019)  
 - The Future of AI at the Hasso Plattner Institute for Digital Health at Mount Sinai (Mount Sinai Health System, 2020)
- 2018 • **eXpression2Kinases (X2K) Web: linking expression signatures to upstream cell signaling networks**  
*Nucleic Acids Research* (2018) 46(W1):W171-W179; <https://doi.org/10.1093/nar/gky458>  
 DJB Clarke, MV Kuleshov, BM Schilder, D Torre, ME Duffy, AB Keenan, A Lachmann, AS Feldmann, GW Gundersen, MC Silverstein, Z Wang  
 **News**  
 - Mount Sinai Faculty Spotlight: Ma'ayan Lab (Mount Sinai Health System, 2018)
- 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* (2015) 17(2):221-243; <https://doi.org/10.1080/15248372.2015.1053483>  
 F Subiaul, L Zimmerman, E Renner, BM Schilder, R Barr
- 2015 • **Take the monkey and run**  
*Journal of Neuroscience Methods* (2015) 248:28-31; <http://doi.org/10.1016/j.jneumeth.2015.03.023>  
 KA Phillips, MK Hambright, K Hewes, BM Schilder, CN Ross, SD Tardif  
 **News**  
 - Monkeys on a Treadmill? A Conversation with Dr. Kimberley Phillips (Why Social Science?)
- 2014 • **Becoming a high-fidelity - super - imitator: what are the contributions of social and individual learning?**  
*Developmental Science* (2014) 18(6):1025-1035; <http://doi.org/10.1111/desc.12276>  
 F Subiaul, EM Patterson, BM Schilder, E Renner, R Barr
- 2014 • **Working memory constraints on imitation and emulation**  
*Journal of Experimental Child Psychology* (2014) 128:190-200; <http://doi.org/10.1016/j.jecp.2014.07.005>  
 F Subiaul, BM Schilder



## PREPRINTS

- 2024 • **Zero-shot transfer learning of genomic disease signatures using single-cell foundation models**  
*arXiv* (2024)  
 BM Schilder
- 2024 • **Harnessing generative AI to annotate the severity of all phenotypic abnormalities within the Human Phenotype Ontology**  
*medRxiv* (2024) <https://doi.org/10.1101/2024.06.10.24308475>  
 KB Murphy, BM Schilder, NG Skene

- 2024 • **Navigating the Phenomic Landscape: systematic characterisation of the latent genomic space underlying all traits and diseases**  
*bioRxiv* (2024) <http://dx.doi.org/10.13140/RG.2.2.12144.26880>  
 BM Schilder, NG Skene
- 2024 • **Active chromatin interaction and histone mark signatures underpin epigenetic TBXT expression in metastatic lung cancer**  
*bioRxiv* (2024)  
 RM Yaa, BM Schilder, RD Acemel, FC Wardle
- 2024 • **Integrative multi-omics analysis of glial signatures associated with accelerated cognitive decline in Alzheimer's disease**  
*bioRxiv* (2024)  
 E Schneegans, N Fancy, V Chau, TKD Cheung, E Adair, M Papageorgopoulou, BM Schilder, PM Matthews, JS Jackson
- 2023 • **Fine-mapping genomic loci refines bipolar disorder risk genes**  
*medRxiv* (2023) <https://www.medrxiv.org/content/10.1101/2024.02.12.24302716v1>  
 M Koromina, A Ravi, G Panagiotaropoulou, BM Schilder, ... S Ripke, T Raj, JRI Coleman, N Mullins  
 **News**  
 - Currently under journal review
- 2023 • **Identification of cell type-specific gene targets underlying thousands of rare diseases and subtraits**  
*medRxiv* (2023) <https://doi.org/10.1101/2023.02.13.23285820>  
 KB Murphy, R Gordon-Smith, J Chapman, M Otani, BM Schilder, NG Skene
- 2022 • **CUT&Tag recovers up to half of ENCODE ChIP-seq peaks**  
*bioRxiv* (2022) <https://doi.org/10.1101/2022.03.30.486382>  
 D Hu, L Abbasova, BM Schilder, A Nott, NG Skene, SJ Marzi



## RESEARCH EXPERIENCE

- |  
2019 • **Lead Data Scientist**  
 120/80 Group 📍 New York, NY, USA  
  - Offers data-driven consultation services to a wide portfolio of high-profile digital healthcare, pharmaceutical and biotech companies.
  - Developed a suite of proprietary softwares to extract customised business intelligence from the published literature to generate customised and interpretable reports to clients.
  - Provides clients guidance on strategic AI implementation, data analysis, publication and transparency.
- 2020  
|  
2018 • **Bioinformatician II**  
 Icahn School of Medicine at Mount Sinai (Department of Neuroscience / Department of Neurology / Department of Genetics & Genomics / Ronald M. Loeb Center for Alzheimer's Disease) 📍 New York, NY, USA  
  - 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).
- 2018  
|  
2017 • **Bioinformatician II**  
 Icahn School of Medicine at Mount Sinai (Department of Pharmacological Sciences) 📍 New York, NY, USA  
  - Conducted computational systems biology research. Integrated and analyzed large-scale genomic and biomedical data (e.g. Python, R, JavaScript).
  - Developed evolutionary algorithm to optimize gene network kinase regulator prediction (eXpression2Kinases).
  - Developed and deployed computational tools, software, databases and web applications for basic and clinical research, resulting in 3 peer-reviewed publications.

- 2013  
|  
2011

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Research Assistant

The George Washington University (Department of Anthropology)

📍 Washington, DC, USA

• Performed dissection, histology, microscopy and quantitative stereology in post-mortem primate brain tissues.

• Trained junior and senior personnel on lab protocols.

2013  
|  
2011

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Senior Lab Manager

The George Washington University (Department of Speech, Language & Hearing Sciences)

📍 Washington, DC, USA

• 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.

2010

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Paid Research Intern

Princeton University (Princeton Neuroscience Institute)

📍 Princeton, NJ, USA

• Investigated the neural basis of decision-making in humans.

• Recruited participants, recorded EEG and analyzed data in MATLAB.

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GRANTS

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Total (all grants): \$2,949,872

Total (as primary applicant): \$311,382

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