Rick A. Reijnders, PhD
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PROFESSIONAL SUMMARY

Data scientist and computational methodologist with a **PhD in machine learning, multi-omics integration, and AI-driven statistical modeling**. Extensive experience in **big data processing, predictive modeling, feature selection, and workflow automation**. Proficient in **R (8+ years, expert level), C, Python, and Linux**, with a strong focus on **efficiency, automation, and optimization**. Experience working with **heterogeneous datasets**, including **structured and unstructured data**. Passionate about **developing robust and scalable AI-driven methodologies** for data integration, forecasting, and decision-making.

WORK EXPERIENCE

Postdoctoral Researcher – AI in Lewy body disease *(2024 – Present)*

Maastricht University, Department of Psychiatry & Neuropsychology

- Developed **unsupervised learning methods** for Lewy body disease (LBD) subtyping using spectral clustering, hierarchical clustering, and PAM clustering.
- Applied **sparse Partial Least Squares Discriminant Analysis** (s-PLS-DA) to train models that distinguish molecular LBD subtypes.
- **Engineered multi-trait Polygenic Risk Scores** (PGS) using LDAK and GWAS summary statistics to assess genetic contributions to disease subtypes.
- Identified candidate therapeutics through gene **signature-based drug matching** using LINCS1000 and CMAP.
- Implemented scalable **machine learning pipelines** for large-scale multi-omics data analysis on **HPC clusters**.
- Developed methylome-wide and transcriptomic **analysis workflows**, integrating RNA-seq normalization (TMM, edgeR) and methylation pre-processing (BMIQ, ComBat, wateRmelon).
- **Optimized performance using C** to speed up feature selection, clustering, and data transformation in R and Python workflows.

PhD Researcher – Machine Learning in PTSD *(2020 – 2024)*

Maastricht University, Department of Psychiatry & Neuropsychology

- Developed **predictive models** with random forests, gradient boosting, SVM, and **deep learning** for biomedical **data analysis**.
- Applied Bayesian inference, LASSO regression, and **AI-driven feature selection** to uncover disease patterns.
- Designed **scalable data pipelines** for preprocessing, integrating, and **analyzing multi-source datasets**.
- Applied **text mining** and topic modeling for scientific literature and **structured data analysis**.
- Used **dimensionality reduction**, segmentation, and feature extraction for biological signal processing.
- Proficient in **Python, R, C, and SQL**, with expertise in NumPy, pandas, TensorFlow, PyTorch, and Scikit-learn.
- Built **multi-omics machine learning models** to predict clinical outcomes in PTSD and Parkinson's disease.
- Applied QTL analysis, mediation models, and **graph-based learning** for network-based **causal inference**.
- Applied **deep generative models** (e.g., **Variational Autoencoders, GANs**) for multi-omics data imputation, improving missing value handling in high-dimensional biological datasets.
- Utilized **transformer-based models** (e.g., GPT, **BERT for bioinformatics**) to generate and refine scientific text, aiding in hypothesis generation and automated literature synthesis.

- **Published and presented** findings in **multidisciplinary teams**, collaborating with researchers and clinicians.

Freelancer – Data Science & Workflow Automation *(2017 – 2022)*

RRworks – IT & Technical Services

- Designed automated AI-driven workflows for data science and research clients, **focusing on text, image, and industrial process optimization**.
- Developed **standalone AI-based automation tools** for rule-based decision-making, improving efficiency in industrial and economic applications.
- Built scalable databases and machine learning models for **economic and social data analysis**.
- Provided **consulting** on AI solutions, helping businesses integrate advanced analytics into decision-making.

Research – Genetic Regulation & Stress (2017 – 2018)

Maastricht University, Department of Bioinformatics – BiGCaT

- Investigated the effects of chronic social defeat stress (CSDS) on DNA methylation, miRNA regulation, and gene expression in mouse and human blood samples.
- **Integrated multi-omics data** (methylation, miRNA, RNAseq) to explore genetic regulation and potential biomarkers for PTSD susceptibility.
- **Applied big data analysis**, network-based approaches, and machine learning to uncover key molecular patterns.
- Developed and **optimized bioinformatics workflows in R** for high-throughput sequencing data.

Project – Antibacterial Polyoxometalates (2016 – 2017)

Chemelot Innovation and Learning Labs (CHILL), Geleen

- Evaluated the antibacterial properties of Polyoxometalates (POMs) through MIC/MBC assays and cell culture experiments.
- Performed aseptic cell culturing, including migration assays, transfection, and differentiation in MRC-5 human cells.
- Designed **experimental workflows** for testing antibacterial efficacy in various conditions.
- Developed a **bioinformatics pipeline** in **Linux** to analyze sequencing data from the Oxford Nanopore MinION.
- Optimized DNA extraction and purification protocols to enhance sequencing accuracy.
- Combined molecular techniques with real-time data processing for rapid sequence analysis.

Project – Fluorescent Magnetic Beads (2013-2014)

MagnaMedics B.V., Geleen

- Designed and synthesized fluorescent magnetic beads for multiplex assays using Quantum Dot technology.
- Conducted **spectral analysis** to optimize fluorescence properties for enhanced sensitivity.
- Developed a fast fungal DNA extraction method using magnetic bead-based technology.
- Validated extraction efficiency through Real-Time PCR and gel electrophoresis for accurate fungal pathogen detection.

EDUCATION

PhD, Systems Biology & AI-Driven Data Integration *(2020–2024)*

Maastricht University, Department of Psychiatry & Neuropsychology

- My thesis: From pieces to picture: systems biology, multi-omics and machine learning in complex brain disorders
- Developed **AI-driven statistical methods** for analyzing complex, multi-source datasets
- Applied machine learning to **large-scale structured and unstructured data**

- Built **automated data workflows** for multi-omics integration and predictive modeling
- Techniques: **Feature selection, network analysis, supervised/unsupervised ML, R programming**

Master of Science (MSc), Systems Biology *(2018–2020)*

Maastricht University, School for Mental Health and Neuroscience (MHeNs)

- Specialized in **computational modeling** and big data analysis
- Developed **classification models** for biological and signal processing
- Worked with **large-scale biological datasets**, applying AI-driven insights

Bachelor of Science (BSc), Biomedical Sciences *(2014–2018)*

Zuyd Hogeschool, Heerlen

- Focused on analytical methods, computational analysis, and statistical modeling

MBO, Laboratory Technology – Biotechnology *(2010–2014)*

Leeuwenborgh, Sittard

- Gained experience in data quality control, experimental design, and molecular analysis

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SELECTED PUBLICATIONS

Machine learning-based prediction of cognitive outcomes in de novo Parkinson's disease
RA Reijnders, J Harvey, R Cavill, A Duits, S Köhler, L Eijssen, BPF Rutten, npj Parkinson's Disease 8 (1), 150

From methylation to myelination: epigenomic and transcriptomic profiling of chronic inactive demyelinated multiple sclerosis lesions
A Tiane, M Schepers, RA Reijnders, L van Veggel, S Chenine, Acta neuropathologica 146 (2), 283-299

Blood-based multivariate methylation risk score for cognitive impairment and dementia
J Koetsier, R Cavill, RA Reijnders, J Harvey, J Homann, M Kouhsar, Alzheimer's & Dementia 20 (10), 6682-6698

Please look here for a complete list.

KEY SKILLS

- **AI & Machine Learning**: Feature selection, predictive modeling, clustering, dimensionality reduction
- **Big Data & Statistical Analysis**: Time-series forecasting, regression, multivariate statistics
- **Programming & Workflow Automation**: **R (8+ years, expert), Python, Linux (Bash scripting), SQL**
- **Data Processing & Integration**: Structured & unstructured data (multi-omics, text, image, economic data)
- **Methodology Development**: AI-driven statistical techniques for data interpretation & prediction

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CERTIFICATIONS

- **Advanced R Programming** *(workflow automation, data pipelines, statistical modeling)*
- **Machine Learning in R & Python** *(classification, regression, unsupervised learning)*
- **Microsoft Office Advanced** (Excel, Word, Macros for automation & reporting)
- **Basic Elements of Safety (VCA)** *(risk assessment & data compliance in research environments)*

ADDITIONAL INFORMATION

- **Languages: Dutch** *(Native),* ***English*** *(Full Professional Proficiency)*
- **Driving License:** AM, B, A
- **Hobbies:** Programming, gaming, 3D printing, automation projects, drone flying, woodworking

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