MARTIN SJOGARD, MSc, PhD

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Clinical data scientist & Cognitive neuroscientist | Biomarker development and deployment

PROFILE

Clinical data scientist with a strong background in computational modeling, statistical analysis, and translational research using cognitive, behavioral, and biosignal data. Over 10 years of hands-on experience with MEG, EEG, MRI, and wearable technologies (e.g., sleep-tracking headbands, accelerometers, actigraphy) to support biomarker development and clinical decision-making. Skilled in building robust, scalable data pipelines and applying advanced signal processing and machine learning techniques to derive actionable insights from high-dimensional health data. Experienced in designing and managing large-scale human studies across healthy and clinical populations, including protocol development, cross-functional coordination, and evaluation of digital health technologies for clinical and research use.

SKILLS

- **Programming Languages:** MATLAB, R, Python, SQL, Julia, Git, bash
- **Data Science & Machine Learning:** pyTorch, scikit-learn, agentic AI
- **Specialized Area:** Neuroimaging, statistical/machine learning, cognitive neuroscience, connectomics
- **Research Skills:** Project leadership, mentoring, writing/reviewing papers, data visualization

EXPERIENCE

- **Harvard Medical School, Massachusetts General Hospital [🌐]** *Jan 2021 - Present*
  Postdoctoral Research Fellow, Sleep, Cognition and Neuroscience (SCAN) lab Boston MA, USA
  - Led end-to-end data science efforts on clinical and interventional studies, integrating clinical outcome assessments with multimodal biosignal data (wearables, EEG, MEG, MRI) to support biomarker discovery
  - Designed and deployed deep learning models to predict neurophysiological patterns from non-invasive EEG, enabling early detection of brain function changes
  - Built and maintained scalable machine learning pipelines for graph-based connectomics inference on high-dimensional neuroimaging data, resulting in novel connectivity-based digital biomarkers
  - Developed novel semi-automated signal processing tools with user interface for quality control and artifact removal in wearable EEG headband, enhancing robustness of real-world data
  - Directed multi-year, cross-functional collaborations spanning clinical, engineering, and data science teams across institutions
  - Supervised and mentored junior researchers, data analysts, and clinical research coordinators

EDUCATION

- **Université Libre de Bruxelles** *Dec 2016 - Oct 2020*
  PhD - Biomedical and Pharmaceutical sciences Brussels, Belgium
- **Norwegian University of Science and Technology** *Aug 2014 - Oct 2016*
  MSc - Neuroscience Trondheim, Norway
- **Norwegian University of Science and Technology** *Aug 2010 - June 2013*
  BSc - Human Movement Science Trondheim, Norway

PROJECTS

- **Improving Signal Quality in Wearable EEG Devices** *2023 - 2025*
  Tools: MATLAB, Python | Wearable EEG headband (4 channels)
  - Designed and validated algorithms to detect and flag cardiac artifacts in wearable EEG recordings
  - Built signal-cleaning pipelines to remove artifacts while preserving physiological signal, improving data quality for real-world applications
- **Sleep Biomarkers and Cognitive Function in Neurodevelopmental Disorders** *2022 - 2025*
  Tools: MATLAB, Python, R | MEG, EEG, MRI
  - Developed novel detection algorithms for sleep spindles using multimodal MEG/EEG data, enhancing spatial accuracy of signal localization
  - Applied biomarker pipeline to assess memory function in schizophrenia and autism, supporting early-stage cognitive biomarker research
- **Hippocampal Ripples and Offline Learning Dynamics** *2023-2025*
  Tools: R, MATLAB | Intracranial EEG, Scalp EEG

- Created preprocessing pipelines for intracranial EEG data in epilepsy patients, optimizing detection of memory-related ripple activity
- Improved ripple classification algorithm, boosting predictive accuracy for learning outcomes
- Led multi-site clinical collaboration from study design through publication

- **Estimating Subcortical Brain Activity from Scalp EEG** *2024-Present*
  Tools: Python, R, MATLAB | Intracranial EEG, Scalp EEG
  - Designed the first pipeline to estimate and classify cortico-subcortical coupling using non-invasive EEG
  - Benchmarked model predictions against intracranial ground truth, enabling development of non-invasive neural biomarkers tied to behavior

- **Predicting Cognitive Decline in Multiple Sclerosis via Functional Connectivity** *2016-2020*
  Tools: R, MATLAB | MEG, MRI
  - Analyzed resting-state MEG data to identify brain network disruptions associated with cognitive deficits in MS
  - Conducted validation of standard neuroimaging algorithms, revealing limitations and proposing improved models
  - Built and analyzed a multi-site clinical dataset including detailed cognitive and functional assessments

PUBLICATIONS

J=PUBLISHED JOURNAL PAPER, A = ACCEPTED, IN PRESS, P=PREPRINT, S=IN SUBMISSION, T=THESIS

[J.1] **Sjøgård M**, et al. (2025). **Hippocampal ripples predict motor learning during brief rest breaks in humans**. *Nature Communications*, 16: 6089.

[J.2] **Sjøgård M**, et al. (2025). **Increased sleep spindles in regions engaged during motor learning predict memory consolidation**. *Journal of Neuroscience*, Accepted, in press.

[J.3] **Sjøgård M**, et al. (2022). **A Novel Approach to Estimating the Cortical Sources of Sleep Spindles Using Simultaneous EEG/MEG**. *Frontiers in Neurology*, 13: 871166.

[J.4] Costers L, ..., **Sjøgård M**, ... (2021). **The role of hippocampal theta oscillations in working memory impairment in multiple sclerosis. Human Brain Mapping 42(5): 1376-1390**. *Frontiers in Neurology*, 13: 871166.

[J.5] Elands S, ..., **Sjøgård M**, ... (2021). **Early Venous Filling Following Thrombectomy: Association With Hemorrhagic Transformation and Functional Outcome**. *Frontiers in Neurology*, 12: 649079.

[J.6] **Sjøgård M**, et al. (2021). **Brain dysconnectivity relates to disability and cognitive impairment in multiple sclerosis**. *Human Brain Mapping*, 42(3): 626-643.

[J.7] Van Schependom J, ..., **Sjøgård M**, ... (2021). **Increased brain atrophy and lesion load is associated with stronger lower alpha MEG power in multiple sclerosis patients**. *NeuroImage: Clinical*, 30: 102632.

[J.8] Costers L, ..., **Sjøgård M**, ... (2020). **Spatiotemporal and spectral dynamics of multi-item working memory as revealed by the n-back task using MEG**. *Human Brain Mapping*, 41(9): 2431-2446.

[J.9] Naeije G, ..., **Sjøgård M**, ... (2020). **Cerebellar cognitive disorder parallels cerebellar motor symptoms in Friedreich ataxia**. *Annuals of Clinical and Translational Neurology*, 7(6):1050-1054.

[J.10] Lamartine MM, ..., **Sjøgård M**, ... (2020). **Electrophysiological evidence of spino-cortical proprioceptive tracts dysfunction in hereditary spastic paraplegia with thin corpus callosum**. *Clinical Neurophysiology*, 131(6): 1171.

[J.11] Naeije G, ..., **Sjøgård M**, ... (2020). **Age of onset determines intrinsic functional brain architecture in Friedreich ataxia**. *Annuals of Clinical and Translational Neurology*, 7 (1): 94-104.

[J.12] Van Schependom J, ..., **Sjøgård M**, ... (2019). **Altered transient brain dynamics in multiple sclerosis: Treatment or pathology?** *Human Brain Mapping*, 40(16): 4789-4800.

[J.13] **Sjøgård M**, et al. (2019). **Do the posterior midline cortices belong to the electrophysiological default-mode network?** *Neuroimage*, 200:221-230.

[P.1] **Sjøgård M**, et al. (2022). **Intrinsic/extrinsic duality of large-scale neural functional integration in the human brain**. *bioRxiv*.

[P.2] Bruffaerts R, ..., **Sjøgård M**, ... (2025) **Functional identification of language-responsive channels in individual participants in MEG investigations**. *bioRxiv*.

[S.1] **Sjøgård M**, et al. (2025). Failure to increase regionally specific spindles after memory encoding predicts sleep-dependent consolidation deficits in schizophrenia. *Manuscript submitted for publication*.