# Dr. Matthew G. Perich

Postdoctoral Fellow
Department of Fundamental Neuroscience
University of Geneva, Geneva, Switzerland

# Curriculum Vitae

*mperich (at) gmail (dot) com*
+41 76 457 84 53
http://mperi.ch

## EDUCATION

| | | | | |
|---|---|---|---|---|
| 2017 | **Ph.D.** | Biomedical Engineering | Northwestern University | Advised by Lee E. Miller |

→ *Dissertation: "The roles of primary motor and dorsal premotor cortex in motor adaptation"*

| | | | |
|---|---|---|---|
| 2015 | **M.S.** | Biomedical Engineering | Northwestern University |
| 2010 | **B.S.** | Bioengineering | University of Pittsburgh |

## RESEARCH EXPERIENCE

**2017 - present** — Postdoctoral Research Fellow — University of Geneva, Switzerland
- *Studying sensorimotor integration during reach and grasp using multi-area recordings of sensorimotor cortex*
- *Developing a brain-spine interface to restore reaching and grasping after cervical spinal cord injury*
- *Developed a brain-spine interface that alleviated gait deficits in a primate model of Parkinson's disease*

**2011 - 2017** — Doctoral Student — Northwestern University, Chicago, IL
- *Performed surgical procedures and behavioral experiments to study motor learning in non-human primates*
- *Formulated the "neural manifold" framework to understand neural population dynamics in behavior*
- *Developed population-level analyses to characterize interactions between cortical areas*

**2010 - 2011** — Visiting Research Fellow — Blue Brain Project, EPFL, Switzerland
- *Studied models of synaptic plasticity within a large-scale cortical simulation and spiking neural networks*

**2008 - 2010** — Undergraduate Research Fellow — University of Pittsburgh, Pittsburgh, PA
- *Developed techniques for decoding of limb state based on cat Ia afferent recordings*

## SELECTED PUBLICATIONS AND PREPRINTS                    *(8 out of 13 since 2010)*

**Perich MG**, Gallego JA, Miller LE (2018) A neural population mechanism for rapid learning. Neuron, 100 (4), 771-773
  → *Associated preview: Kaufman MT (2018) Adapting fine with a little help from the null space. Neuron, 100 (4)*

**Perich MG**\*, Gallego JA\*, Chowdhury RH, Solla SA, Miller LE (2018) A stable, long-term cortical signature underlying consistent behavior. bioRxiv. (*: co-first authors; order reversed in this CV*)

Gallego JA, **Perich MG**, Naufel SN, Ethier CE, Solla SA, Miller LE (2018) Cortical population activity within a preserved neural manifold underlies multiple motor behaviors. Nature Communications, 9, 4233 → *Editor's Highlight for Oct. 2018*

Glaser JI, **Perich MG**, Ramkumar P, Miller LE, Körding KP (2018) Population coding of conditional probability distributions in dorsal premotor cortex. Nature Communications, 9, 1788

Gallego JA, **Perich MG**, Miller LE, Solla SA (2017) Neural manifolds for the control of movement. Neuron, 94 (5), 978-984

Dyer EL, Azar MG, **Perich MG**, Fernandes HL, Naufel SN, Miller LE, Körding KP (2017) A cryptography-based approach for movement decoding. Nature BME, 1 (12), 967→ *Press: Scientific American, "Cracking the Brain's Enigma Code"*

Lawlor PN, **Perich MG**, Miller LE, Körding KP (2018) Linear-nonlinear-time-warp-Poisson models of neural activity. Journal of Computational Neuroscience, 45 (3), 173-191

**Perich MG**, & Miller LE (2017) Altered tuning does not account for behavioral adaptation during force field learning. Experimental Brain Research. 235 (9), 2689-2704

## GRANTS AND FELLOWSHIPS

| | |
|---|---|
| 2017 - 2018 | Whitaker International Scholars Program postdoctoral fellowship |
| 2015 - 2017 | NIH NINDS F31 Ruth L. Kirschstein National Research Service Award (NRSA) |
| 2014 - 2015 | NIH NICHD T32 training fellowship |
| 2010 - 2011 | Whitaker International Fellows Program predoctoral fellowship |
| 2008 - 2010 | Undergraduate research fellowship from Univ. of Pittsburgh and Carnegie Mellon Univ. |

## TEACHING EXPERIENCE

| | | | |
|---|---|---|---|
| 2017 | Guest lecturer | Soft robotics | Taught by Mitra Hartmann at Northwestern Univ. |
| 2013 | Teaching assistant | Exp. methods and design | Taught by Eric Perreault at Northwestern Univ. |
| 2010 | Teaching assistant | Bioinstrumentation | Taught by George Stetten at the Univ. of Pittsburgh |
| 2009 | Teaching assistant | Human Physiology | Taught by Alan F. Sved at the Univ. of Pittsburgh |

## MENTORSHIP EXPERIENCE

| | |
|---|---|
| 2018 - present | Supervising one M.S. student and one Ph.D. student at the University of Fribourg |
| 2017 - present | Assisting with supervision of five Ph.D. students at the University of Fribourg and EPFL |
| 2012 | Supervised a high school student on an independent research project |

## SELECTED TALKS AND SEMINARS *(7 out of 9 since 2011)*

2019    Cortical dynamics of sensorimotor integration during reaching and grasping. **Invited talk.** German Primate Center (DPZ), Göttingen, Germany. *(scheduled for May 23, 2019)*

2018    A brain-spine interface to alleviate gait deficits of Parkinson's Disease. Whitaker seminar. Budapest, Hungary.

2017    Dorsal premotor cortex recruits primary motor cortex during force field adaptation. Neural Control of Movement Society meeting, Dublin, Ireland. → *NCM Society Scholarship award recipient*

2017    Dorsal premotor cortex recruits primary motor cortex during force field adaptation. Shirley Ryan Ability Lab (formerly Rehabilitation Institute of Chicago), Chicago, IL.

2016    Functional relation between primary motor cortex and dorsal premotor cortex is altered during curl field learning. Society for Neuroscience meeting, San Diego, CA.

2014    Cortical function during motor learning. **Invited talk.** University of Pittsburgh, Pittsburgh, PA.

2013    Neural correlates of adaptation to dynamic and kinematic perturbations in dorsal premotor cortex. Translational and Computational Motor Control (TCMC, aka MLMC), San Diego, CA. → *Ranked #5 of all abstracts*

## SELECTED CONFERENCE PRESENTATIONS *(7 out of 27 since 2009)*

2019    **Perich MG**, …, Capogrosso M*, Milekovic T*. A communication subspace isolates population-level interactions between motor and somatosensory cortex. Neural Control of Movement Society, Toyama, Japan. (*: co-last authors)

2018    **Perich MG**, Conti S, Barra B, …, Capogrosso M*, Milekovic T*. Probing the cortical sensorimotor network of nonhuman primates during reaching and grasping. Society for Neuroscience, San Diego. (*: co-last authors)

2018    **Perich MG***, Barra B*, Conti S, Kaeser M, Bloch J, Courtine G, Milekovic T[#], Capogrosso M[#]. Towards brain-controlled neuromodulation of the cervical spinal cord for the restoration of arm and hand movement in tetraplegia. Hand, Brain, and Technology: The Somatosensory System. Ascona, CH. (*,#: equal contribution)

2018    **Perich MG**, Milekovic T, Raschella F, …, Courtine G. Cortically-controlled neuromodulation of spinal motor circuits to alleviate gait deficits of Parkinson's disease. CoSyNe. Denver.

2015    **Perich MG**, Lawlor PN, Miller LE. Movement planning and execution in primary motor cortex and dorsal premotor cortex during motor learning. Society for Neuroscience meeting. Chicago.

2014    **Perich, MG**, Miller LE. Stability of kinematic neural decoding with perturbed movements. IEEE EMBC. Chicago.

2009    **Perich MG**, Hokanson J, Gaunt R, Weber D. Improving Limb-State Decoding Using a Liquid State Machine. Biomedical Engineering Society (BMES) meeting. Pittsburgh.

## SELECTED AWARDS AND HONORS

| | |
|---|---|
| 2018 | Best poster presentation honorable mention: Hand, Brain, and Technology 2018 meeting |
| 2017 | Neural Control of Movement Society scholarship award |
| 2010 | University of Pittsburgh Bioengineering Outstanding Signals and Imaging Graduate |
| 2006 - 2010 | University Honors College academic honors scholarship to the University of Pittsburgh |
| 2006 - 2007 | Mollohan Foundation High Technology Scholar |

## OPEN DATA SHARING

**Perich MG**, Lawlor PN, Kording KP, Miller LE (2018) Extracellular neural recordings from macaque primary and dorsal premotor motor cortex during a sequential reaching task. CRCNS.org. http://dx.doi.org/10.6080/K0FT8J72

## PROFESSIONAL SOCIETIES AND SERVICE

| | | |
|---|---|---|
| 2019 | **Organizer** | Co-organized the workshop "Manifolds for Neural Computation" at OCNS 2019 |
| 2017 - 2019 | Reviewer | Reviewer or co-reviewer for Nature Neuroscience, IEEE Haptics |
| 2013 - *present* | Member | Society for Neuroscience, Neural Control of Movement Society, IEEE EMBS |

## SCIENCE OUTREACH

| | |
|---|---|
| 2012 - 2017 | **Get-a-Grip Outreach Program** → *Served as co-President 2015 - 2017* |
| | Taught elementary school classes about prosthetics and general engineering concepts |
| 2013 - 2015 | **Northwestern University Brain Awareness Organization (NUBAO)** |
| | Assisted with the "Brain Fair" to teach elementary school students about neuroscience |

## REFERENCES

*References may be furnished upon request.*