

DAVID J. HERZFELD

Curriculum Vitae

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CONTACT INFORMATION

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EDUCATION

2016	Ph.D.	Johns Hopkins University, Department of Biomedical Engineering
2011	M.S.	Marquette University, Department of Biomedical Engineering
2010	B.S.	Marquette University, Department of Biomedical Engineering

ACADEMIC APPOINTMENTS

2018 - current	Post-doctoral Fellow, Laboratory of Stephen G. Lisberger Duke University, Department of Neurobiology
2016 - 2018	Post-doctoral Fellow, Laboratory of Reza Shadmehr Johns Hopkins University, Department of Biomedical Engineering

RESEARCH GRANTS

2020 - current	National Institutes of Health (K99EY030528, Role: PI) National Eye Institute K99/R00: Pathway to Independence Award Title: Principles of operation of a neural learning circuit
2016 - 2018	Johns Hopkins Distinguished Science of Learning Fellowship (Role: PI) Johns Hopkins Science of Learning Institute Title: How does the cerebellum update our movements following an error?
2014 - 2016	National Institutes of Health (F31NS090860, Role: PI) National Institute of Neurological Disorders and Stroke Ruth L. Kirschstein National Research Service Award Title: A memory of errors in motor adaptation

PUBLICATIONS

Herzfeld, D.J., Hall, N.J., Tringides, M., and S.G. Lisberger. Principles of operation of a cerebellar learning circuit. *eLife*, 9:e55217, 2020.

Sedaghat-Nejad E., Herzfeld, D.J., Hage, P., Karbasi, K., Palin, T., Wang, X., and R. Shadmehr. Behavioral training of marmosets and electrophysiological recording from the cerebellum. *Journal of Neurophysiology*, 122(4):1502-1517, 2019.

Sedaghat-Nejad E., Herzfeld, D.J., and R. Shadmehr. Reward prediction error modulates saccade vigor. *Journal of Neuroscience*, 39(25):5010-5017, 2019.

- Reppert, T.R., Rigas, I., Herzfeld, D.J., Sedaghat-Nejad, E., Komogortsev O., and R. Shadmehr. Movement vigor as a trait-like attribute of individuality. *Journal of Neurophysiology*, 120(2):741-757, 2018.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Encoding of error and learning to correct that error by the Purkinje cells of the cerebellum. *Nature Neuroscience*, 21(5):736-743, 2018.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Encoding of action in the Purkinje cells of the cerebellum. *Nature*, 526:439-442, 2015.
- Herzfeld, D.J., Vaswani, P.A., Marko, M.K., and R. Shadmehr. A memory of errors in sensorimotor learning. *Science*, 345:1349-1353, 2014.
- Herzfeld, D.J.*, Pastor, D.*, Haith, A.M., Rossetti, Y., Shadmehr, R., and J. O’Shea. Contributions of the cerebellum and the motor cortex to acquisition and retention of motor memories. *NeuroImage*, 98:147-158, 2014.
- Herzfeld, D.J. and S.A. Beardsley. Improved multi-unit decoding at the brain-machine interface using population temporal linear filtering. *Journal Neural Engineering*, 7(4):046012, 2010.

CONFERENCE PROCEEDINGS

- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. A cerebellar network architecture underlying error-based learning. *MLMC: Advances in Motor Learning and Motor Control*, 2017.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Error-dependent changes in cerebellar Purkinje cells during saccadic adaptation. *MLMC: Advances in Motor Learning and Motor Control*, 2016.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Encoding of action in the Purkinje cells of the cerebellum. *TCMC: Translational and Computational Motor Control*, 2014.
- Herzfeld, D.J., Vaswani, P.A., Marko, M.K. and R. Shadmehr. Sensitivity of motor adaptation depends on the history of experienced errors. *TCMC: Translational and Computational Motor Control*, 2013.
- Herzfeld, D.J. and S.A. Beardsley. Synaptic Weighting for Physiological Responses in Recurrent Spiking Neural Networks. *IEEE Engineering in Medicine and Biology*. 2011:4187-90, 2011.
- Herzfeld, D.J., Olson, L.E. and C.A. Struble. Pools of virtual boxes: building campus grids with virtual machines. *HPDC: Proceedings of the ACM*. 667–675, 2010.

REVIEWS

- Herzfeld, D.J. and R. Shadmehr. Cerebellar output encodes a corrective saccadic command. *European Journal of Neuroscience*, doi: 10.1111/ejn.13345, 2016.
- Herzfeld, D.J. and R. Shadmehr. Motor variability is not noise, but grist for the learning mill. *Nature Neuroscience*, 17(2):149-50, 2014.
- Herzfeld, D.J. and R. Shadmehr. Cerebellum estimates the sensory state of the body. *Trends in Cognitive Sciences*, 18(2)66-7, 2013.

HONORS & AWARDS

- 2018 McKnight Allison J. Doupe Fellowship
McKnight Foundation Annual Meeting
- 2018 Paul Ehrlich Research Award
Johns Hopkins Young Investigators’ Day
- 2017 Donald B. Lindsley Prize in Behavioral Neuroscience
Society for Neuroscience

- 2016 David T. Yue Award for Research Excellence in Biomedical Engineering
Johns Hopkins University, Department of Biomedical Engineering
- 2016 Martin & Carol Macht Research Award
Johns Hopkins Young Investigators' Day
- 2016 Siebel Scholar, Class of 2016
Thomas and Stacey Siebel Foundation
- 2015 Mette Strand Research Award
Johns Hopkins Young Investigators' Day
- 2015 Society for the Neural Control of Movement Young Investigators Scholarship Award
Society for the Neural Control of Movement
- 2010 Richard W. Jobling Fellowship
Marquette University, Department of Biomedical Engineering
- 2009 Anthony J. and Rose E. Bagoszzi Medical Research Fellowship
Marquette University, Department of Biomedical Engineering
- 2010 Top Scholar in Curriculum
Marquette University, Department of Biomedical Engineering

SELECTED INVITED TALKS

- 2016 Encoding of action in the Purkinje cells of the cerebellum
Symposium: The Neural Basis of Adaptive Motor Control in the Cerebellum
Society for Neuroscience Annual Meeting
- 2016 Error-dependent changes in cerebellar Purkinje cells during saccadic adaptation
MLMC: Advances in Motor Learning and Motor Control
- 2016 Motor learning: An overview of methods and models.
Learning at the Interface of Vision and Oculomotor control
Bernstein Conference
- 2015 Encoding of action in the Purkinje cells of the cerebellum
Gordon Cerebellar Conference
- 2015 Encoding of action in the Purkinje cells of the cerebellum
Neural Control of Movement
- 2014 A memory of errors in sensorimotor learning
Brotz Seminar, Marquette University
- 2013 Learning from error in sensorimotor learning
Workshop on Neural Population Dynamics Underlying Sensorimotor Integration
Janelia Farms (HHMI)
- 2013 Learning from error: history of past errors dictates sensitivity to error
TCMC: Translational and Computational Motor Control Conference

PATENTS

- 2015 Devices, systems and methods for evaluation and feedback of neuromodulation treatment
U.S. and International Patents (45973616, 13/281,269, 9066720)

TEACHING EXPERIENCE

- 2014 Learning Theory
Johns Hopkins University, Teaching Assistant & Guest Lecturer
- 2014 Introduction to Embedded Microcontrollers
Johns Hopkins University, Instructor

- 2011 Biocomputer Design Lab II
Marquette University, Teaching Assistant
- 2011 Embedded Biomedical Instrumentation
Marquette University, Teaching Assistant
- 2011 Computing for Biomedical Engineers
Marquette University, Teaching Assistant & Guest Lecturer
- 2010 Biocomputer Design Lab I
Marquette University, Teaching Assistant & Guest Lecturer

PROFESSIONAL SERVICE

Ad-hoc Reviewer: *eLife*, *PLOS Biology*, *Journal of Neuroscience*, *PLOS Computational Biology*, *European Journal of Neuroscience*, *Journal of Neurophysiology*, *NeuroImage*, *Experimental Brain Research*, *Neural Networks*

SELECTED ABSTRACTS

- Herzfeld, D.J. and S.G. Lisberger. Transfer of cerebellar motor learning in smooth pursuit eye movements between sites with distinct behavioral and neural properties. *Gordon Cerebellar Conference*, 2019.
- Herzfeld, D.J. and S.G. Lisberger. Transfer of cerebellar motor learning in smooth pursuit eye movements between sites with distinct behavioral and neural properties. *Soc. Neurosci*, 2019.
- Hall, N.J., Herzfeld, D.J., and S.G. Lisberger. Spike sorting for multichannel recordings in floccular complex of the primate cerebellum. *Soc. Neurosci*, 2019.
- Karbasi, K., Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Sensory prediction error, not motor error, drives complex spikes in the Purkinje cells of the cerebellum. *Soc. Neurosci*, 2019.
- Herzfeld, D.J., Tringides, M., Subramanian, D., and S.G. Lisberger. Properties of the signals that drive directional learning in smooth pursuit eye movements. *Soc. Neurosci*, 2018.
- Sedaghat-Nejad, E., Herzfeld, D.J., and R. Shadmehr. Reward-prediction-error modulates learning for sensory-prediction-error. *Soc. Neurosci*, 2018.
- Orozco, S.P., Herzfeld, D.J., and R. Shadmehr. Signatures of the fast and slow learning processes in the motor commands that move the eyes during a saccade. *Soc. Neurosci*, 2018.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Cerebellar complex spikes encode error direction and magnitude. *Soc. Neurosci*, 2017.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Organization of the cerebellum by prediction errors reveals bidirectional changes during saccade adaptation. *Soc. Neural Control of Movement*, 2017.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Sensory prediction errors during saccade adaptation drive cerebellar complex spikes and learning. *Soc. Neurosci*, 2016
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Encoding of action in the Purkinje cells of the cerebellum. *Soc. Neurosci*, 2015.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Encoding of action in the Purkinje cells of the cerebellum. *Gordon Cerebellar Conference*, 2015.
- Shadmehr, R. and D.J. Herzfeld. Changes in error-sensitivity account for sensorimotor savings. *Soc. Neurosci*, 2014.
- Herzfeld, D.J., Kojima, Y., Soetedjo, R., and R. Shadmehr. Encoding of prediction error by complex spikes of the cerebellum. *Soc. Neurosci*, 2014.

- Herzfeld, D.J., Vaswani, P.A., and R. Shadmehr. Sensitivity of motor adaptation depends on the history of experienced errors. *Soc. Neurosci*, 2013.
- Herzfeld, D.J., Vaswani, P.A., Marko, M.K., Kojima, Y., Soetedjo, R., and R. Shadmehr. Sensitivity of motor adaptation depends on the history of experienced errors. *Gordon Cerebellar Conference*, 2013.
- Herzfeld, D.J., and R. Shadmehr. Sensitivity to error depends on perturbation statistics. *Soc. Neurosci*, 2012.
- Herzfeld, D.J., and S.A. Beardsley. Localization of synaptic changes using simulated hemodynamic responses. *Soc. Neurosci*, 2011.
- Herzfeld, D.J., and S.A. Beardsley. Improved multi-unit decoding at the brain-machine interface using population temporal linear filtering. *Soc. Neurosci*, 2009.