CURRICULUM VITAE

Beata Jarosiewicz, Ph.D.
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Education:

- **Ph.D. in Neuroscience** at the Department of Neuroscience and Center for the Neural Basis of Cognition (CNBC), University of Pittsburgh. Thesis committee: William Skaggs (advisor), Carl Olson (chair), Bruce McNaughton, James McClelland, David Touretzky, James Ranck, Anthony Grace. 1998-2003.
- **B.S. in Psychology, Pre-Medicine**, University of Illinois in Champaign-Urbana. GPA: 3.98/4. *Summa Cum Laude*, with Distinction in Psychology. 1994-1998.

Research experience:

Current position: Assistant Professor (Research), Brown University; Research Associate (IPA), Rehabilitation R&D Service, Department of Veterans Affairs

- **The BrainGate neural interface system for people with paralysis**. Improving the robustness and quality of neural control and automating self-calibration of brain-computer interfaces for people with paralysis. Supervisors: Dr. Leigh Hochberg and Dr. John Donoghue. Department of Neuroscience, Brown University, January 2010 – present.

Postdoctoral research

- **V1 origins of dorsal and ventral visual processing streams.** Using fluorescent neuronal tracing and in vivo two-photon calcium imaging in ferrets, compared the functional properties of cells in primary visual cortex that project to the dorsal vs. ventral visual cortical processing streams. Advisor: Dr. Mriganka Sur. Brain and Cognitive Sciences & Picower Institute for Learning and Memory, Massachusetts Institute of Technology, May 2006-January 2010.

- **Using brain-computer interfaces to study the brain's solution to the Credit Assignment Problem.** Using a brain-computer interface, showed that the tuning functions of randomly selected subsets of neurons in monkey motor cortex can be altered by changing the way their spiking activity is decoded. Advisor: Dr. Andrew Schwartz, Dept. of Neurobiology, University of Pittsburgh; in collaboration with Dr. Robert Kass, Statistics, Carnegie Mellon University. 2004-2006.

PhD research

- **The Small Irregular Activity state in the rat hippocampus**. Using tetrode arrays to record from large ensembles of single units in rat hippocampus, characterized the hippocampal and neocortical neural activity, level of arousal, and generation mechanisms of a novel physiological state between sleep and waking. Advisor: Dr. William Skaggs, Dept. of Neuroscience and the Center for the Neural Basis of Cognition, University of Pittsburgh, 1998-2003.

Undergraduate research

- **Physiological changes in the rat cerebellar cortex following motor skill learning**. Honors Independent Undergraduate Research Thesis. Advisor: Dr. William T. Greenough, Dept. of Psychology and Neuroscience, Beckman Institute, University of Illinois, 1996-1998.

- **Human cognition: The role of the hippocampus in learning and memory.** Advisor: Dr. Neal J. Cohen, Dept. of Psychology and Neuroscience, Beckman Institute, University of Illinois, 1995.

Fellowships and awards:

- Craig H. Neilsen Foundation Postdoctoral Fellowship, 2011-2013.
- Herbert Pardes Clinical Research Excellence Award - most outstanding Clinical Research Achievement of 2012 (for *Hochberg et al., 2012*; see below).
- NIH Postdoctoral Ruth L. Kirschstein National Research Service Award, 2006-2009.
- Andrew Mellon Predoctoral Fellowship, 2002-2003.
- EU Advanced Course in Computational Neuroscience, Trieste, Italy, 1999.
- National Science Foundation Graduate Research Fellowship, 1998-2001.
- Howard Hughes Medical Institute Predoctoral Fellowship, Honorable Mention, 1998.
- Department of Defense Science and Engineering Graduate Fellowship, Honorable Mention, 1998.
- University of Illinois Bronze Tablet, May 1998.
- University of Illinois Edmund J. James Scholar, 1996-1998.
- University of Illinois Dean's List, 1994-1998.

Invited talks:

- "BrainGate: toward a self-calibrating intracortical brain-computer interface for people with tetraplegia." University of Connecticut Behavioral Neuroscience Seminar, January 28, 2016.
- "Toward a self-calibrating intracortical brain-computer interface for people with tetraplegia." GDR 2904 (tr. Multielectrode systems for Neuroscience) 6th annual meeting, Grenoble-Autrans, France, January 7, 2016.
- "BrainGate: toward a practical brain-computer interface for people with paralysis." Keynote lecture for 7th Annual Texas A&M Institute for Neuroscience Symposium, March 27, 2015.
- "BrainGate: toward a practical intracortical brain-computer interface for people with paralysis." Brown University Neuroscience Graduate Program (NSGP) annual retreat, Bristol, RI. August 28, 2014.
- "BrainGate: toward a practical intracortical brain-computer interface for people with paralysis." IGERT Neuroengineering Symposium, University of Illinois, Urbana, IL. June 19, 2014.
- "Brain-computer interfaces for people with paralysis." Wellesley College, Wellesley, MA. November 5, 2013.
- "Neural coding and decoding: An overview of the neuroscience and neurophysiology behind intracortical brain-computer interfaces" and "BrainGate: Toward the development of brain-computer interfaces for people with paralysis." Brain-Mind Institute, Michigan State University, Lansing, MI. July 27 and 28, 2013.
- "Using brain-computer interfaces to restore function and communication to people with tetraplegia." National Brain & Cognition Initiative, Amsterdam, Netherlands. May 16, 2013.
- "Brain-computer interfaces: The BrainGate experience." Transformational Technologies Conference, Rancho Los Amigos, Downey, CA. February 23, 2013.
- "BrainGate: A neural interface system for people with paralysis." Lecture for Neuroscience Senior Seminar taught by Bill Church, Trinity College, Hartford, CT. Feb 10, 2011.
- "BrainGate: Toward the development of a neural interface system for people with paralysis." Brain Injury Association of Rhode Island Conference, Warwick, RI. March 30, 2012.
- "Progress toward autonomous neural interfaces for people with tetraplegia." CNBC Alumni Colloquium, University of Pittsburgh, Pittsburgh, PA. Nov 3, 2011.
- "Context dependence of neural tuning: Implications for neural prosthetics." Computational and Systems Neuroscience (COSYNE) workshop on Emerging System Theories in BMI Neuroscience (organizers: Jose Carmena, Michael Gatspar), Salt Lake City, UT. Feb 28, 2011.
- "Neuroscience and free will." Lecture for Harvard University Philosophy of Science discussion group. April 26, 2010.
- "Neural plasticity and consciousness." Lecture for Harvard University Philosophy of Science discussion group. Oct 5, 2009.
- "Neural plasticity, prosthetics, and consciousness." Guest lecture at 2006 Dartmouth Summer Institute in Cognitive Neuroscience. June 29, 2006.
- "Plasticity of preferred directions in primate motor cortex." Neural Control of Movement annual meeting, Key Biscayne, FL. April 15, 2005.

Teaching experience:

- Guest lecture for Hampshire College course Statistical Analysis of Neural Data: "BrainGate: Toward practical brain-computer interfaces for people with paralysis." March 11, 2015.
- As "Director for Undergraduate Research" at BrainGate, mentored 5 undergraduate honors students in independent research theses (William Schweitzer, Camille Spencer-Salmon, Lev Litichevskiy, Daniel Milstein, Andrew Jones). Department of Neuroscience, Brown University, 2012-2016.
- Guest lecture for Brown University course Perception and Mind (CLPS 0500): "BrainGate: Brain-computer interfaces for people with paralysis." April 10, 2014.
- Yearly guest lecture for Brown University course Neuroengineering (ENGN 1220): "Neural Coding and Decoding," Feb. 26, 2013; March 18, 2014; March 12, 2015.
- Yearly guest lecture for Brown University course Visually-guided Action and Cognitive Processes (CLPS 1580A-S01): "Population coding and neural prosthetics." Nov 5, 2010; Nov. 8, 2012; April 10, 2014. The 2012 lecture was evaluated and critiqued by 3 consultants at the Brown University Sheridan Center for Teaching and Learning.
- Developed and co-taught a neuroscience summer course for MIT's High School Studies Program, 2009.
- Joint guest lecture with Rob Kass (statistics, Carnegie Mellon University) for CNBC course Neural Plasticity in Sensory and Motor Systems, taught by Alison Barth, Justin Crowley, and Nathan Urban, April 18, 2005.
- Guest lecture for CNBC core course Cognitive Neuroscience, taught by James McClelland and Carl Olson, "Hippocampal memory reactivation during sleep." Oct 29, 2002.
- Recitation Instructor and Teaching Assistant for required undergraduate Neuroscience course Neurophysiology 1012, taught by Jon Johnson and Steve Meriney, University of Pittsburgh, Spring 2000.
- Tutored college students in psychology as member of Psi Chi, the Psychology honors society, University of Illinois, 1996.
- Traveled to local high schools to teach principles of neuroscience to groups of students using hands-on demonstrations. University of Pittsburgh, 1998-2002.

Public outreach:

- Presented a poster on BrainGate's research at Mind Brain Research Day, Brown University, March 25, 2015.
- Interviewed along with other leaders of the BrainGate team and a former BrainGate participant for an 8-page feature in Wired (UK), December 2014.
- Provided project guidance to the Spessard Holland Elementary School (Polk County, Florida) robotics team in the First Lego League *World Class Learning* Challenge, 2014.
- Interviewed for an article and podcast in TechEmergence.com, "From the Neural to the Digital: An Interview with Beata Jarosiewicz." July 29, 2014.
- Presented BrainGate's research to the public as part of Brown University's 250th anniversary celebration, Providence, RI, March 8, 2014.
- Yearly guest lecture on BrainGate's research for SPIRA, an Engineering Camp for female high school students, Providence, RI; July 15, 2013; July 16, 2014; July 16, 2015.
- Presented BrainGate's work to individuals with neurodegeneration with brain iron accumulation (NBIA) and their families and caregivers at the 7th International NBIA Disorders Association Family Conference, San Antonio, TX, April 5, 2013.
- Co-wrote a spread about BrainGate for Johns Hopkins Center for Talented Youth magazine *imagine* (20:1, p. 16-19), September 2012.
- Represented careers in neuroscience for Weymouth High School's *Career Café*, sponsored by Massachusetts Society for Medical Research, April 11, 2012.
- Presented BrainGate's work on brain-computer interfaces to a general audience at Everett Dance Theater's *Brain Café, a Dialogue at the Intersection of Neuroscience, Medicine and the Arts*, March 31, 2011.
- Provided project guidance to 3 separate teams of grade school children competing in the First Lego League *Body Forward* Challenge, 2010.
- Presented BrainGate's work to the science teachers of Weymouth High School. *Science Café*, sponsored by Massachusetts Society for Medical Research, October 7, 2010.

Other services and memberships:

- Reviewer for Neuron, Journal of Neurophysiology, Journal of Neural Engineering, Frontiers in Systems Neuroscience, Annals of Neurology, Clinical EEG and Neuroscience, PloS ONE, Nature Biotechnology
- Reviewer for Computational and Systems Neuroscience (COSYNE) Meeting, 2013
- Reviewer for International BCI Meeting, 2013
- Member of American Society of Neurorehabilitation, 2015
- Member of Society for Neuroscience, 1999-present

Peer-reviewed publications:

Jarosiewicz B, Sarma AA, Bacher D, Masse NY, Simeral JD, Sorice B, Oakley EM, Blabe C, Pandarinath C, Gilja V, Cash SS, Eskandar E, Friehs G, Henderson JM, Shenoy KV, Donoghue JP, Hochberg LR (2015) Virtual typing by people with tetraplegia using a self-calibrating intracortical brain-computer interface. *Science Translational Medicine* 11(7): 313RA179.
→ featured in Scientific American, IEEE Spectrum, Science News, Medical Design Technology, etc.

Bacher D, **Jarosiewicz B**, Masse N, Stavisky SD, Simeral JD, Cash SS (2015) Neural point-and-click communication by a person with incomplete locked-in syndrome. *Neurorehabilitation and Neural Repair* 29(5):462-71.

Masse NY, **Jarosiewicz B**, Simeral JD, Bacher D, Stavisky SD, Cash SS, Oakley EM, Berhanu E, Eskandar E, Friehs G, Hochberg LR, Donoghue JP (2014) Non-causal spike filtering improves decoding of movement intention for intracortical BCIs. *Journal of Neuroscience Methods* 236: 58-67.

Jarosiewicz B, Masse NY, Bacher D, Cash SS, Eskandar E, Friehs G, Donoghue JP, Hochberg LR (2013) Advantages of closed-loop calibration in intracortical brain-computer interfaces for people with tetraplegia. *Journal of Neural Engineering* 10(4): 046012.

Hochberg LR, Bacher D*, **Jarosiewicz B***, Masse NY*, Simeral JD*, Vogel J*, Haddadin S, Liu J, Cash SS, van der Smagt P, Donoghue JP (2012) Reach and grasp by people with tetraplegia using a neurally controlled robotic arm. *Nature* 485: 372-375. *these authors contributed equally
→ featured in the New York Times, Wall Street Journal, Washington Post, CBS, NPR, etc.
→ awarded Clinical Research Forum's "Herbert Pardes Clinical Research Excellence Award" as the most outstanding Clinical Research Achievement of 2012.

Jarosiewicz B, Schummers J, Malik WQ, Brown EN, Sur M (2012) Functional biases in visual cortex neurons with identified projections to higher cortical areas. *Current Biology* 22: 269-277.

Jarosiewicz B, Chase SM, Fraser GW, Velliste M, Kass RE, Schwartz AB (2008) Functional network reorganization during learning in a brain-computer interface paradigm. *PNAS* 105(49):19486-19491.
→ featured in Faculty of 1000 Biology: *http://www.f1000biology.com/article/id/1158542/evaluation*

Jarosiewicz B, Skaggs WE (2004) Hippocampal place cells are not controlled by visual input during the small irregular activity state in the rat. *J Neurosci* 24(21):5070-5077.

Jarosiewicz B, Skaggs WE (2004) Level of arousal during the small irregular activity state in the rat hippocampal EEG. *J Neurophysiol* 92:2649-2657.

Jarosiewicz B, McNaughton BL, Skaggs WE (2002) Hippocampal population activity during the small amplitude irregular activity state in the rat. *J Neurosci* 22(4):1373-1384.
→ featured in *Nature Reviews Neuroscience* 'Highlights', *Science* 'Editor's Choice'

Invited reviews:

Jarosiewicz B, Hochberg LR (2014) Intracranial brain-computer interfaces for communication and control. In Selzer M, Clarke S, Cohen L, Kwakkel G, Miller RH, eds. *Textbook of Neural Repair and Rehabilitation, 2nd Edition (Vol. 1)*, Cambridge University Press, Chapter 40, p. 577-585.

Masse NY, **Jarosiewicz B** (2012) Systèmes d'interface neuronale: Le future c'est (presque) maintenant. [Neural interface systems: the future is (almost) here.] *medecine/sciences* 28:26-28.

Jarosiewicz B (2010) Steering a cursor with mental math. *Journal Watch Neurology* 12(10): 76.

Selected conference presentations:

Jarosiewicz B, Sarma AA, Simeral JD, Bacher D, Saab J, Sorice B, Blabe CH, Cash SS, Eskandar EN, Shenoy K V., Henderson JM, Hochberg LR (2015). Multi-day self-calibration of a point-and-click communication BCI for people with tetraplegia. *Soc Neurosci Abstr* 522.03.

Jarosiewicz B, Bacher D, Sarma AA, Masse NY, Berhanu ED, Sorice B, Oakley EM, Newell K, Blabe CH, Pandrinath C, Shenoy KV, Henderson JM, Simeral JD, Donoghue JP, Hochberg LR (2014). Progress toward a self-calibrating, practical intracortical BCI for people with tetraplegia. *Soc Neurosci Abstr* 252.03.

Jarosiewicz B, Bacher D, Sarma AA, Masse NY, Simeral JD, Sorice B, Oakley EM, Blabe CH, Pandrinath C, Cash SS, Eskandar E, Friehs G, Shenoy KV, Henderson JM, Donoghue JP, Hochberg LR (2014). Virtual typing by people with tetraplegia using a stabilized, self-calibrating intracortical brain-computer interface. *IEEE EMBS BRAIN Grand Challenges*, Washington, DC.

Jarosiewicz B, Milekovic T, Sarma AA, Hochberg LR, Donoghue JP (2013). Selecting data for unsupervised decoder calibration during practical BCI use. *Soc Neurosci Abstr* 80.05.

Milekovic T, **Jarosiewicz B**, Sarma AA, Hochberg LR, Donoghue JP (2013). Increases in beta frequency band LFP activity mark low engagement of motor cortex in voluntary movement intentions in people with long-standing tetraplegia. *IEEE EMBS Neuroengineering* DT5.24.

Jarosiewicz B, Bacher D, Masse NY, Hochberg LR, Donoghue JP (2012). Unsupervised filter calibration during ongoing use of the BrainGate2 neural interface by people with paralysis. *Soc Neurosci Abstr* 583.05.
→ selected for presentation to the Office of Science and Technology Policy at the White House

Jarosiewicz B, Masse NY, Bacher D, Hochberg LR, Donoghue JP (2011). Context dependence of neural tuning in motor cortex of people with paralysis: implications for neural prosthetics. *Soc Neurosci Abstr* 142.22.

Bacher D, **Jarosiewicz B**, Masse N, Simeral JD, Donoghue JP, Hochberg LR (2011). Neural point-and-click communication by an individual with tetraplegia using the BrainGate intracortical neural interface system five years post-implant. *Soc Neurosci Abstr* 142.10.

Jarosiewicz B, Velliste M, Schwartz AB (2005) Plasticity of preferred directions in primate motor cortex. *Soc Neurosci Abstr* 401.2.

Spalding M, Velliste M, **Jarosiewicz B**, Kirkwood G, Schwartz AB (2004) Direct brain control of an anthropomorphic robotic arm during a feeding task. *Soc Neurosci Abstr* 421.21.

Velliste M, Spalding M, **Jarosiewicz B**, Schwartz AB (2004) Adaptive real-time brain control algorithm that does not require hand motion for initialization. *Soc Neurosci Abstr* 884.15.