

HYOSUB E. KIM

(updated: September 2021)

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ACADEMIC APPOINTMENTS

Assistant Professor Department of Physical Therapy (Joint affiliations: Departments of Psychological & Brain Sciences, Biomedical Engineering) University of Delaware	2018-
Postdoctoral Fellow, Adviser: Richard B. Ivry Department of Psychology and Helen Wills Neuroscience Institute University of California, Berkeley	2015-2018

EDUCATION

PhD in Neuroscience, Advisers: T. George Hornby and Daniel M. Corcos University of Illinois at Chicago	2015
Doctor of Physical Therapy University of Illinois at Chicago	2012
Bachelor of Music The Juilliard School	2000

RESEARCH GRANTS

National Institutes of Health (R01 19A00599) National Institute of Child Health & Human Development Role: Co-Investigator (PI: Reisman) Title: Behavioral and neurophysiologic processes of locomotor learning after stroke	4/1/2020 - 3/31/2025
National Science Foundation (M3X 1934650) Division of Civil, Mechanical and Manufacturing Innovation Role: Co-PI (with Semrau, Sergi, and Medina) Title: Understanding and Enhancing Proprioception via Model-Based Human-Robot Interactions	12/1/2019 - 11/30/2023

National Institutes of Health (K12 HD055931)

9/1/2019 - 8/31/2022

National Center for Medical Rehabilitation Research

Role: PI/Scholar

Title: Behavioral and computational processes of motor learning
in individuals with Parkinson disease

PUBLICATIONS

- Parrell, B., **Kim, H.E.**, Breska, A., Saxena, A., & Ivry, R.B. (2021). Differential effects of cerebellar degeneration on feedforward versus feedback control across speech and reaching movements. *Journal of Neuroscience* (in press).
- Wood, J. M., Morton, S. M., & **Kim, H. E.** (2021). The Consistency of Prior Movements Shapes Locomotor Use-Dependent Learning. *ENeuro*, 8(5).
<https://doi.org/10.1523/ENEURO.0265-20.2021>
- Avraham, G., Morehead, J. R., **Kim, H. E.**, & Ivry, R. B. (2021). Reexposure to a sensorimotor perturbation produces opposite effects on explicit and implicit learning processes. *PLOS Biology*, 19(3), e3001147.
- Tsay, J. S., **Kim, H. E.**, Parvin, D. E., Stover, A. R., & Ivry, R. B. (2021). Individual differences in proprioception predict the extent of implicit sensorimotor adaptation. *Journal of Neurophysiology*, 125(4), 1307–1321.
- Kim, H. E.***, Avraham, G.*, & Ivry, R. B. (2021). The Psychology of Reaching: Action Selection, Movement Implementation, and Sensorimotor Learning. *Annual Review of Psychology*, 72(1), 61–95. *co-first authors
- Miller, A., Pohlig, R. T., Wright, T., **Kim, H.E.**, & Reisman, D. S. (2021). Beyond Physical Capacity: Factors Associated with Real-world Walking Activity Post Stroke. *Archives of Physical Medicine and Rehabilitation*.
- Tsay, J. S., Avraham, G., **Kim, H. E.**, Parvin, D. E., Wang, Z., & Ivry, R. B. (2020). The Effect of Visual Uncertainty on Implicit Motor Adaptation. *Journal of Neurophysiology*.
- Tsay, J.S., Haith, A.M., Ivry, R.B., **Kim, H.E.** (2020). Distinct processing of sensory-prediction error and target error during implicit motor adaptation. *Proc. Advances in Motor Learning and Motor Control*.
- Avraham, G., Morehead, J.R., Malaviya, M., **Kim, H.E.**, Ivry, R.B. (2020). Explicit and Implicit Processes Exhibit Opposite Effects Upon Relearning a Sensorimotor Perturbation. *Proc. Advances Motor Learning and Motor Control*.

- Wood, J. M., **Kim, H. E.**, French, M. A., Reisman, D. S., & Morton, S. M. (2020). Use-dependent plasticity explains aftereffects in visually guided locomotor learning of a novel step length asymmetry. *Journal of Neurophysiology*, 124(1), 32–39.
- Tsay, J.S., Avraham, G., **Kim, H.E.**, Parvin, D.E., Wang, Z., Ivry, R.B. (2019). The effect of visual uncertainty on implicit sensorimotor adaptation. *Proc. Advances Motor Learning and Motor Control*.
- Kim, H. E.**, Parvin, D. E., & Ivry, R. B. (2019). The influence of task outcome on implicit motor learning. *eLife*, 8, e39882.
- Kim, H. E.**, Morehead, J. R., Parvin, D. E., Moazzezi, R., & Ivry, R. B. (2018). Invariant errors reveal limitations in motor correction rather than constraints on error sensitivity. *Communications Biology*, 1(1), 19.
- Charalambous, C. C., Alcantara, C. C., French, M. A., Li, X., Matt, K. S., **Kim, H. E.**, Morton, S. M., & Reisman, D. S. (2018). A single exercise bout and locomotor learning after stroke: Physiological, behavioural, and computational outcomes. *The Journal of Physiology*, 596(10), 1999–2016.
- Leech, K. A.*, **Kim, H. E.***, & Hornby, T. G. (2018). Strategies to augment volitional and reflex function may improve locomotor capacity following incomplete spinal cord injury. *Journal of Neurophysiology*, 119(3), 894–903. *co-first authors
- Kim, H.E.**, Parvin, D.E., Hernandez, M., Ivry, R.B. (2017). Implicit rewards modulate sensorimotor adaptation. *Proc. Advances in Motor Learning and Motor Control*.
- Kim, H. E.**, Corcos, D. M., & Hornby, T. G. (2015). Increased spinal reflex excitability is associated with enhanced central activation during voluntary lengthening contractions in human spinal cord injury. *Journal of Neurophysiology*, 114(1), 427–439.
- Kim, H. E.**, Thompson, C. K., & Hornby, T. G. (2015). Muscle activation varies with contraction mode in human spinal cord injury. *Muscle & Nerve*, 51(2), 235–245.
- Smith, A. C., Parrish, T. B., Hoggarth, M. A., McPherson, J. G., Tysseling, V. M., Wasielewski, M., **Kim, H. E.**, Hornby, T. G., & Elliott, J. M. (2015). Potential associations between chronic whiplash and incomplete spinal cord injury. *Spinal Cord Series and Cases*, 1.
- Kim, H.E.**, Sulaimon, S., Menezes, S., Son, A., & Menezes, W. J. C. (2011). A Comparative Study of Successful Central Nervous System Drugs Using Molecular Modeling. *Journal of Chemical Education*, 88(10), 1389–1393. <https://doi.org/10.1021/ed100824u>

PREPRINTS (*under review*)

- Listman, J. B., Tsay, J., **Kim, H. E.**, Mackey, W. E., & Heeger, D. J. (2021). Long-term Motor Learning in the Wild with High Volume Video Game Data. *BioRxiv*, 2021.09.15.460516. <https://doi.org/10.1101/2021.09.15.460516>
- Tsay, J., Haith, A., Ivry, R. B., & **Kim, H. E.** (2021). Distinct Processing of Sensory Prediction Error and Task Error during Motor Learning. *BioRxiv*, 2021.06.20.449180. <https://doi.org/10.1101/2021.06.20.449180>
- Hart, B. M. 't, Achakulvisut, T., Akrami, A., Alicea, B., Beierholm, U., Blohm, G., Bonnen, K., Butler, J., Caie, B., Cheng, Y., Chow, H. M., David, I., DeWitt, E., Drugowitsch, J., Dwivedi, K., Fiquet, P.-É., Forest, J., Galbraith, B., Gu, Q., **Kim, H.E.**, ... Wyble, B. (2021). Neuromatch Academy: A 3-week, online summer school in computational neuroscience. *OSF Preprints*. <https://doi.org/10.31219/osf.io/9fp4v>

HONORS AND AWARDS

- | | |
|---|--------------|
| Best Abstract in Basic Science category, Combined Sections Meeting of the American Physical Therapy Association | 2021 |
| Programming Committee member, Advances in Motor Learning and Motor Control (MLMC) | 2020-present |
| Promotion of Doctoral Studies (PODS) II Scholarship, Mary Lou Barnes Award for best application within Neurology, Foundation for Physical Therapy | 2014 |
| Promotion of Doctoral Studies (PODS) I Scholarship, Patricia Leahy Award for best application within Neurology, Foundation for Physical Therapy | 2013 |
| Baskin Award for Excellence in Research, Rehabilitation Institute of Chicago | 2013 |
| Florence P. Kendall Doctoral Scholarship, Foundation for Physical Therapy | 2012 |
| Graduation Prize for Best Research Report, University of Illinois at Chicago | 2012 |

INVITED TALKS (*selected*)

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|---|------|
| Distinct processing of sensory-prediction error and target error during implicit motor adaptation
<i>Neural Control of Movement, Dubrovnik, Croatia (cancelled due to COVID-19 pandemic)</i> | 2020 |
| How computational modeling can advance neurorehabilitation: Insights from studies of individuals with chronic stroke
<i>American Physical Therapy Association (APTA), Denver, CO</i> | 2020 |
| Systems interactions in sensorimotor learning
<i>Ohio University, Ohio Musculoskeletal and Neurological Institute, Athens, OH</i> | 2019 |

- Behavioral and computational features of implicit motor learning 2019
University of Delaware, Department of Mathematical Sciences
- Behavioral and computational features of implicit motor adaptation 2019
University of Delaware, Department of Psychological & Brain Sciences
- Implicit rewards modulate sensorimotor adaptation 2017
Advances in Motor Learning and Motor Control (MLMC), Washington D.C.
- Modulation of soleus H-reflexes during dynamic contractions in 2015
individuals with incomplete spinal cord injury
APTA Combined Sections Meeting, Indianapolis, IN

ABSTRACTS (selected)

- Tsay, J.S., **Kim, H.E.**, Ivry, R.B. (2021). A unified model of the sensory constraints on implicit adaptation. *Society for the Neural Control of Movement*.
- Wood, J.M., Morton, S.M., **Kim, H.E.** (2021). Movement variability constrains locomotor use-dependent learning. *Society for the Neural Control of Movement*.
- Russell, E., Miller, A., Reisman, D.S., **Kim, H.E.***, Dinh, V.* (2021). A machine learning approach to predict stepping activity levels in individuals with chronic stroke. *American Society of NeuroRehabilitation (ASNR)*. *co-senior authors
- Kim, H.E.**, Senevirathne, K., Mirelman, A. (2021). Classification of Parkinson's Disease Status Using Machine Learning and Gait Data.* *APTA Combined Sections Meeting* (*received Best Poster award)
- Wood, J.M., **Kim, H.E.**, French, M.A., Reisman, D.S., Morton, S.M. (2020). The Contribution of Use-Dependent Plasticity to Locomotor Learning. *APTA Combined Sections Meeting*.
- Avraham, G., Parvin, D.E., **Kim, H.E.**, Morehead, J.R., Ivry, R.B (2019). Desensitization upon relearning for implicit sensorimotor adaptation. *Society for Neuroscience*.
- Wood, J.M., **Kim, H.E.**, Reisman, D.S., Morton, S.M. (2019). The contribution of use dependent plasticity to locomotor learning. *Society for Neuroscience*.
- Alexander, B., Ivry, R.B., Inglis, T., **Kim, H.E.**, Chua, R. (2019). Improved discrimination of visual sensory prediction errors with tendon vibration. *Canadian Society for Psychomotor Learning and Sport Psychology*.
- Tsay, J.X., Parvin, D.E., Avraham, G., **Kim, H.E.**, Wang, Z., Ivry, R.B. (2019). Perceptual uncertainty attenuates implicit motor adaptation. *Cognitive Neuroscience Society*.

Morehead, J.R., **Kim, H.E.**, Parvin, D.E., Ivry, R.B., Smith, M.A. (2018). Searching for sensitization to visuomotor errors with task-irrelevant clamped feedback. *Society for Neuroscience*.

Parrell, B., **Kim, H.E.**, Breska, A., Ivry, R.B. (2018). Dissociable effects of cerebellar degeneration on adaptation and online correction across motor domains. *Society for Neuroscience*.

Kim, H.E., Parvin, D.E., Ivry, R.B. (2018). Use-dependent biases due to movement repetition are small and unaffected by rewards. *Society for the Neural Control of Movement*.

Kim, H.E., Parvin, D.E., Ivry, R.B. (2017). Target size modulates motor adaptation from sensory prediction errors. *Society for the Neural Control of Movement*.

Kim, H.E., Morehead, J.R., Boggess, M.J., Shwe, W., Dixon, T.C., Parvin, D.E., Ivry, R.B. (2016). Sensorimotor adaptation during small visual error clamps: error size-dependent effects on rate but not magnitude. *Society for Neuroscience*.

Kim, H.E., Rogers, L.M., Corcos, D.M., Hornby, T.G. (2015). Supraspinal changes following human spinal cord injury contribute to altered neural activation strategies during dynamic contractions. *Society for Neuroscience*.

Kim, H.E., Thompson, C.K., Hornby, T.G. (2014). Increased central activation during eccentric contractions is associated with decreased spinal inhibition during muscle lengthening in human spinal cord injury. *International Motoneuron Meeting*.

ADDITIONAL TRAINING

Training in Grantsmanship for Rehabilitation Research (TIGRR) Medical University of South Carolina	2020
Computational Sensory-Motor Neuroscience (CoSMo) Summer School University of Minnesota	2017

PROFESSIONAL SERVICE

Neuromatch Academy (NMA)

Content Reviewer (Probability and Statistics pre-course; Bayesian statistics day)	2021
Teaching Assistant	2020

Ad hoc Reviewer: *eLife*, *Journal of Cognitive Neuroscience*, *PLOS Computational Biology*, *PLOS One*, *Journal of Neurophysiology*, *Neuropsychologia*, *European Journal of Neuroscience*,

Attention, Perception, & Psychophysics, Scientific Reports, Neurorehabilitation & Neural Repair, Motor Control

TEACHING

University of Delaware

Clinical Neuroscience, Course Coordinator and Lead Lecturer 2020-present
Seminar on Sensorimotor Learning, Course Coordinator 2019

University of Illinois at Chicago

Systems Physiology and Plasticity, Teaching Assistant and Guest Lecturer 2010-2014
Biophysics, Guest Lecturer 2013

MENTORING

University of Delaware

Faculty Mentor

Jonathan Wood (2019-present), PhD student in Biomechanics and Movement Science
Kaneel Senevirathne (2020-21), Master's degree student in Biomedical Engineering
Xin Li (2018-2019), postdoctoral fellow, Department of Physical Therapy
Suzannah Hoguet (2021-present), undergraduate student
Nicholas Sekulski (2021-present), undergraduate student
Heran Yosef (2020-present), undergraduate student
Joie Tang (2019-present), undergraduate student
Chanel Smith (2018-2019), undergraduate student

Dissertation Committee Member

Riwa Safa (projected date: 2023), PhD student in Psychological & Brain Sciences
Jonathan Wood (projected date: 2022), PhD student in Biomechanics and Movement Science
Duncan Tulimieri (projected date: 2022), PhD student in Biomechanics and Movement Science

Senior Thesis Faculty Mentor

Joie Tang (2020)

University of California, Berkeley

Jonathan S. Tsay (2018-present), PhD student in Psychology
Arohi Saxena (2017-2019), undergraduate student
Matthew Hernandez (2016-2018), undergraduate student
Wendy Shwe (2015-2016), undergraduate student

OUTREACH (*programs related to Equity, Diversity and Inclusion in STEM*)

Undergraduate Summer Research Program, University of Delaware, Faculty Mentor	2020
NSF Research Experiences for Undergraduates (REU): Summer Workshop in Cognitive and Brain Sciences, University of Delaware, Lecturer	2019
Advancing Diversity in Physical Therapy (ADaPT), University of Delaware, Faculty Mentor	2019
NSF Research Experiences for Undergraduates (REU), UC Berkeley, Mentor	2017
NIH R25: Bridges to the Baccalaureate Program, UC Berkeley, Mentor	2016

PROFESSIONAL SOCIETIES

Society for Neuroscience
Society for the Neural Control of Movement
American Physical Therapy Association, Neurology and Research Sections