

Robert Arthur Scheidt

Education

PhD	Biomedical Engineering, Northwestern University , Evanston, Illinois	December, 1998
	<i>Effects of mechanical and visual constraints during voluntary movement of the arm</i>	
MS	Biomedical Engineering, Northwestern University , Evanston, Illinois	June, 1992
	<i>Modeling of binocular sensory interactions in the spatial, disparity, and time domains during the human fusional response</i>	
BS	Electrical Engineering (cum laude), Marquette University , Milwaukee, Wisconsin	June, 1989

Appointments Subsequent to Doctoral Degree

	Marquette University , Milwaukee, Wisconsin	August, 2000 - Present
	<i>Associate Professor: Department of Biomedical Engineering</i>	
	<i>Director: Neuromotor Control Laboratory</i>	
	Northwestern University Feinberg School of Medicine , Chicago, Illinois	September, 2002 - Present
	Rehabilitation Institute of Chicago	
	<i>Adjunct Assistant Professor: Department of Physical Medicine and Rehabilitation</i>	
	Medical College of Wisconsin , Milwaukee, Wisconsin	July, 2007 - Present
	<i>Adjunct Assistant Professor: Department of Radiology</i>	
	Baxter Healthcare; Fenwal Division , Round Lake, Illinois	June, 1999 - August, 2000
	<i>Principal Engineer and Subsystem Lead</i>	
	Medical Research Labs , Buffalo Grove, Illinois	March, 1997 - June 1999
	<i>Senior Research Scientist</i>	

Honors and Professional Affiliations

Recipient: Way-Klingler Science Fellowship Award, Marquette University, 2010-2013.
Visiting Scholar: The Weizmann Institute, Rehovot, Israel, May, 2005
CAREER Award; National Science Foundation, 2003.
Invited Participant: Academic Leadership Program, Whitaker Foundation, 2004.
Recipient: Baskin Award for Excellence in Research; Rehabilitation Institute of Chicago, 2000
Recipient: Distinguished postdoctoral fellowship in Biomedical Engineering, Johns Hopkins Univ., 2000
Walter P. Murphy Fellowship, Northwestern University, 1989-1990
Member: IEEE (Senior Grade), ASEE, Soc. for Neuroscience, Soc. for the Neural Control of Movement, American Physiological Soc., **TBII** Engineering Honor Soc., **HKN** Electrical Engineering Honor Soc.

Research Grants

PI: "Control of Arm Posture and Movement Following Stroke." \$1.5M, NIH/NICHHD R01: 2008-13.
coI: "Multi-Joint Sensorimotor Dysfunction of the Stroke Arm" (PI: Schmit): 2005-9.
PI: "CAREER: Adaptive Control in Biological and Man-made Systems." \$400k, NSF BES: 2003-8.
Project PI: "Quantifying Motor Adaptation Following Stroke." \$167k, NIH R24 grant to RIRC. 2002-6.
PI: "Sensory feedback contributions to motor adaptation in humans." \$239k, Whitaker Found. 2002-5.
PI: "Robotics in Rehabilitation Engineering" \$72k, Alvin W. and Marion Birnschein Found. 2002-2004.

Peer-Reviewed Journal Papers

- 16) Stoeckmann T, Sullivan K & **Scheidt RA**. (2009) Elastic, viscous, and mass load effects on post-stroke muscle recruitment and cocontraction during reaching: A pilot study. *In press: PT Journal*
- 15) Liu X & **Scheidt RA**. (2008) Contributions of online visual feedback to the learning and generalization of novel finger coordination patterns. *J. Neurophysiol* 99:2546-2557.
- 14) Ghez C **Scheidt RA** and Heijink H. (2007) Different learned coordinate frames for planning trajectories and final positions in reaching. *J. Neurophysiol.* 98: 3614-3626.
- 13) **Scheidt RA** & Ghez C. (2007) Separate adaptive mechanisms for controlling trajectory and final position in reaching. *J. Neurophysiol.* 98: 3600-3613.
- 12) Suminski A, Zimbelman J & **Scheidt RA**. (2007) Design and validation of an MR-compatible pneumatic manipulandum. *J. Neurosci Meth.* 163: 255-266.
- 11) **Scheidt RA** & Stoeckmann T. (2007) Reach adaptation and final position control amid environmental uncertainty following stroke. *J. Neurophysiol.* 97: 2824-2836.
- 10) Suminski A, Rao SM, Mosier KM & **Scheidt RA**. (2007) Neural and electromyographic correlates of wrist posture regulation. *J. Neurophysiol* 97: 1527-1545.
- 9) Mosier KM, **Scheidt RA**, Acosta S, & Mussa-Ivaldi FA (2005) Remapping hand movements in a novel geometrical environment. *J Neurophysiol.* 94: 4362-4372.
- 8) **Scheidt RA**, Conditt M, Secco EL & Mussa-Ivaldi FA (2005) Interaction of visual and proprioceptive feedback during adaptation of human reaching movements *J Neurophysiol* 93: 3200-13.
- 7) Benz EN, Hornby TG, Bode RK, **Scheidt RA** & Schmit BD. (2005) A Physiologically Based Clinical Measure for Spasticity in Spinal Cord Injury. *Arch Phys Med Rehabil.* 86: 52-9.
- 6) Kuiken TA, Amir H & **Scheidt RA**. (2004) Computerized biofeedback knee goniometer: Acceptance and effect on exercise behavior in post TKA rehabilitation. *Arch Phys Med Rehabil.* 85: 1026-30.
- 5) **Scheidt RA**, Dingwell JB & Mussa-Ivaldi FA. (2001) Learning to move amid uncertainty. *J Neurophysiol* 86, 971-985.

**Peer-Reviewed
Conference
Papers**

- 4) Takahashi CD, **Scheidt RA** & Reinkensmeyer DJ (2001) Impedance control and internal model formation when reaching in a randomly varying dynamical environment. *J Neurophysiol* 86, 1047-51
- 3) **Scheidt RA**, Conditt MA, Reinkensmeyer DJ & Mussa-Ivaldi FA (2000) Persistence of motor adaptation during constrained, multi-joint, arm movements. *J Neurophysiology*, 84, 853-862.
- 2) **Scheidt RA** & Rymer WZ. (2000) Control strategies for the transition from multi-joint to single-joint arm movements studied using a simple mechanical constraint. *J Neurophysiology*, 83, 1-12.
- 1) **Scheidt RA** & Kertesz AE. (1993) Temporal and spatial aspects of sensory interactions during human fusional response. *Vision Research*, 33, 1259-1270.
- 18) Zimbelman JL, Suminski, AJ, Rao SM, & **Scheidt RA** (2007) Predicting the future: neural correlates of internal models. *NeuroImage*, 36: Suppl 1, p. S65.
- 17) Suminski AJ, Rao SM, & **Scheidt RA** (2007) Contribution of the cerebellum and posterior parietal cortex in the integration of visual and proprioceptive feedback for the online correction of performance errors during stabilization of wrist posture. *NeuroImage*, 36: Suppl 1, p. S40.
- 16) Suminski AJ, Zimbelman JL, & **Scheidt RA** (2007) Experimental validation of a MR-compatible pneumatic manipulandum for imaging the neural correlates of motor control. *NeuroImage*, 36: Suppl 1, p. S123.
- 15) Zimbelman JL, Bratcher K, Rao SM, Suminski AJ & **Scheidt RA** (2007) Neural activity in primary sensorimotor cortex increases with movement extent (not force) during goal-directed movement. *NeuroImage*, 36: Suppl 1, p.S76.
- 14) Karnik S, Johnson MJ and **Scheidt RA** (2007) Evaluation of position based cueing strategies for bilateral robotic assessment and therapy after stroke. *Proc RESNA Conf*. Phoenix, Arizona.
- 13) Patton J, Wei Y, Scharver, C, Kenyon RV and **Scheidt RA** (2006) Motivating rehabilitation by distorting reality. *Proc Intl. Conf Biorob*. Pisa, Italy.
- 12) **Scheidt, RA** & Stoeckmann, T (2005) Characterization of Motor Adaptation and Limb Posture Regulation During Arm Reaching Movements Following Stroke. *IEEE Intern. Conf Robotics Rehab*.
- 11) Wei Y, Patton J, Baja P & **Scheidt R** (2005) Visual Error Augmentation for Enhancing Motor Learning and Rehabilitative Relearning. *IEEE Intern. Conf Robotics Rehab*. Chicago, IL.
- 10) Wei Y, Patton J, Baja P & **Scheidt R** (2004) A real-time haptic/graphic demonstration of how error augmentation can enhance learning. *Proc International Conf Robotics and Automation*.
- 9) **Scheidt, RA** (2004) A vector-ARX model of motor adaptation during reaching. *Advances in Computational Motor Control III- Society for Neuroscience*, SanDiego, CA.
- 8) Lillis, KP & **Scheidt, RA** (2003) Sensitivity to hand path curvature during reaching. *IEEE EMBS Soc*. Cancun MX.
- 7) **Scheidt, RA**, Waples, L & Ropella, KM (2002) Reengineering biomedical engineering curricula: A new product development approach. *Proceed. of the IEEE EMBS/BMES Soc.*, Houston, Tx.
- 6) Suminski, AJ, Ropella, KM & **Scheidt RA** (2002) A pneumatically actuated manipulandum for neuromotor control research. *Proceed. of the IEEE EMBS/BMES Soc.*, Houston, Tx
- 5) Lillis, KP, Amans, MR & **Scheidt RA** (2002) Design and Validation of a real-time controller for a two-joint neurorehabilitation robot. *Proceed. of the IEEE EMBS/BMES Soc.*, Houston, Tx.
- 4) Amans, MR, Lillis, KP & **Scheidt RA** (2002) Compensation for the passive dynamics of a five-bar neurorehabilitation robot. *Proceed. of the IEEE EMBS/BMES Soc.*, Houston, Tx.
- 3) Mussa-Ivaldi, FA, Conditt, MA, Dingwell, JB, Karniel, A, Mah, CD, Patton, JL & **Scheidt RA** (2002) A force-field approach to the adaptive control and learning of arm movements. Proceedings of the 4th World Congress of Biomechanics, Calgary, Alberta, Canada, August 4-9, 2002.
- 2) **Scheidt, RA** & Rymer, WZ (1996) A comparison of single- and multi-joint arm movements in the horizontal plane. *Engineering Foundation Conference*, Deer Creek, Ohio.
- 1) Battocletti, JH, Myers, TJ & **Scheidt, RA** (1989) A low-field P-31 NMR spectrometer to measure bonemineral in the human wrist. *Proceedings of the IEEE/EMBS Society*.
- 55) Conrad M, **Scheidt RA**, Schmit B (2008) Effects of sensory manipulations on targeted arm movements after stroke. *Soc. Neurosci*, 32. Washington DC.
- 54) Poladia C, **Scheidt RA**, Beardsley S (2008) Systems Identification of Sensory-Motor Control for Visually Guided Wrist Movements. *Soc. Neurosci*, 32. Washington DC.
- 53) Gregor N, Chua M, Matheys L, Nathan D, Rath S, Walker E, Xu R, **Scheidt RA** (2008) Temporal delays between visualizing the hand and onset of reaching degrades movement accuracy. *Soc. Neurosci*, 32. Washington DC.
- 52) Liu X, **Scheidt RA** (2008) Differential reorganization of redundant control variables in adapting to rotation and dilation of a novel sensorimotor mapping. *Soc. Neurosci*, 32. Washington DC.
- 51) Conrad M, **Scheidt RA**, Schmit B (2008) Effects of vibration on targeted arm movements. *Neural Cont. Movement Soc*, Naples, FL.
- 50) Asnani S, Ghez C & **Scheidt RA** (2008) Differential control of arm trajectory and final position: electromyographic correlates of trajectory planning errors. *Neural Cont. Movement Soc*, Naples, FL.

**Meeting
Abstracts**

- 49) Kanade P, Ghez C & **Scheidt RA** (2008) Spatial mapping of posture-dependent endpoint forces in the hypertonic arm post-stroke: a novel application of rehabilitation robotics. *Neural Cont. Movement Soc*, Naples, FL.
- 48) Smith M, **Scheidt RA** & Mussa-Ivaldi FA (2008) Error clamps for studying motor learning: How the ability to experimentally control error signals can give new insights into motor adaptation. *Neural Cont. Movement Soc*, Naples, FL.
- 47) Kurtzer I, Perreault E, Sainburg R & **Scheidt RA** (2008) Flexibility and coordination of upper limb reflexes. *Neural Cont. Movement Soc*, Naples, FL.
- 46) Zimbelman JL, Suminski, AJ, Rao SM, & **Scheidt RA** (2008) Neural correlates of internal models for adapting goal-directed wrist movements. *Abstr Am Phys Thera Assn*.
- 45) Suminski A, Rao S, Mosier K and **Scheidt R** (2007) Distinct neuronal circuits process kinematic performance errors over long and short time scales during wrist stabilization. *Neural Cont. Movement Soc*, Seville Spain.
- 44) Zimbelman J, Suminski A, Rao S and **Scheidt R** (2007) Predicting the future: neural correlates of internal models in the cerebellum and anterior cingulate. *Neural Cont. Movement Soc*, Seville Spain.
- 43) Bastian A, **Scheidt R**, Celnik P and Krakauer J (2007) Does our current understanding of motor learning and memory actually help patients? *Neural Cont. Movement Soc*, Seville Spain.
- 42) Pompe JW, Suminski AJ and **Scheidt RA** (2006) Neural Correlates of Wrist Stabilization Guided by Time-Varying Visual Feedback. *Proceedings of the BMES Society Annual Meeting, Chicago, IL*.
- 41) Suminski AJ, Zimbelman JL and **Scheidt RA** (2006) Experimental Validation of an MR-Compatible Manipulandum. *Proceedings of the BMES Society Annual Meeting, Chicago IL*.
- 40) Haswell TM and **Scheidt RA** (2006) Does motor adaptation depend on the statistical properties of the environment? *Abstr. of the Soc. for Neuroscience*, 32. Atlanta, GA.
- 39) Heijink H, Ghez C and **Scheidt RA** (2006) Reaching errors reflect separate sources of spatial and temporal variability in trajectory and final position planning. *Abstr. Soc. Neurosci*, 32. Atlanta, GA.
- 38) Zimbelman, JL, **Scheidt RA**, Rao SM and Suminski AJ (2006) During reach, neural activity in primary sensorimotor areas increases with movement extent, not force. *Abstr. Soc. Neurosci*, 32. Atlanta, GA.
- 37) Suminski AJ, Rao SM, Mosier KM and Scheidt RA (2006) Contributions of premotor-parietal networks to sensory-to-motor transformations - an fMRI study. *Abstr. of the Soc. for Neuroscience*, 32. Atlanta, GA.
- 36) **Scheidt RA** and Ghez C (2006) Asymmetric transfer of learning and systematic extent errors are predicted by independent control of trajectory and final equilibrium position in reaching. *Neural Cont. Movement Soc*. Key Biscayne, FL.
- 35) Suminski A, Rao S, Mosier K and **Scheidt RA** (2006) Neural and Electromyographic Correlates of Wrist Posture Regulation in Humans. *Neural Cont. Movement Soc*. Key Biscayne, FL.
- 34) Liu X and **Scheidt RA** (2006) Trial-by-trial remapping of novel motor coordination patterns. *Neural Cont. Movement Soc*. Key Biscayne, FL.
- 33) **Scheidt RA** & Ghez C (2006) Independent control of trajectory and final equilibrium position predicts asymmetric transfer of learning and systematic extent errors in reaching. *Computational Motor Control Workshop II*, Ben-Gurion University, Israel.
- 32) Bengston M, Suminski A, Tomkowiak M, Asnani S & **Scheidt RA** (2005) Effects of auditory biofeedback on wrist stabilization. *Proceedings of the IEEE/EMBS Society*.
- 31) Liu X, Mosier KM, Mussa-Ivaldi FA & **Scheidt RA** (2005) Learning novel finger coordination by reduced visual feedback. *Abstr. of the Soc. for Neuroscience*, 31. Washington, DC.
- 30) Mosier KM, **Scheidt RA**, Acosta S, Lau C, Wang Y & Mussa-Ivaldi FA (2005) Motor space learning: behavioral mechanisms and neural correlates of remapping hand movements in a novel geometrical environment. *Abstr. of the Soc. for Neuroscience*, 31. Washington, DC.
- 29) Ghez C, **Scheidt R**, & Mussa-Ivaldi, FA (2005) Posture and movement invoke separate adaptive mechanisms and are represented in different coordinate systems. *Proceedings of the Computational Motor Control Workshop*, Ben-Gurion University, Israel.
- 28) Thoroughman K, Sabes P, **Scheidt R** & Smith M. (2005) Movement-by-movement Motor Adaptation: A Novel Window into Computations and Mechanisms of Neural Control. *Neural Cont. Movement Soc*. Key Biscayne, FL.
- 27) Mosier KM, **Scheidt, RA** & Mussa-Ivaldi FA (2005) Independent neural mechanisms for the control of posture and movement in learning control of an artificial endpoint. *Neural Cont. Movement Soc*. Key Biscayne, FL.
- 26) Ghez C, I Dinstein, J Cappell, & **Scheidt RA** (2004) Posture and movement are encoded in different coordinate systems. *Abstr. of the Soc. for Neuroscience*, 30. San Diego, CA.
- 25) **Scheidt RA**, Mussa-Ivaldi FA & Ghez C (2004) Posture and movement invoke separate adaptive mechanisms. *Abstr. of the Soc. for Neuroscience*, 30. San Diego, CA.

- 24) Suminski, AJ, Rao, SM, Verber, M, Mosier, KM & **Scheidt, RA** (2004) Sensorimotor coincidence enhances cerebellar output during feedback stabilization of the wrist. *Abstr. of the Soc. for Neuroscience*, 30. San Diego, CA.
- 23) Mosier, KM, **Scheidt, RA**, Acosta, S & Mussa-Ivaldi, FA (2004) Remapping of finger coordination in a novel geometrical environment: a non-invasive testbed for brain-machine interfaces. *Abstr. of the Soc. for Neuroscience*, 30. San Diego, CA.
- 22) Suminski, AJ & **Scheidt, RA** (2004) Control system for mri compatible pneumatic manipulandum. *Proceed. of the IEEE EMBS Soc.*
- 21) Mosier KM, Wang, Y **Scheidt, R**, Acosta, S & Mussa-Ivaldi, FA (2004) Radiology and the cyborg: a novel functional imaging paradigm as a testbed for brain-machine interfaces. *Abstr. of the Radiological Society of North America.*
- 20) Mosier, KM, **Scheidt, RA**, Acosta, S & Mussa-Ivaldi, FA (2004) Learning control in novel coordinate systems: Implications for Brain-Machine Interfaces. *Abstr. Neural Cont. Movement Soc.*
- 19) **Scheidt, RA** & Stoeckmann, T (2004) Reaching in uncertain environments following stroke. *Proc. Neural Control of Movement Soc.*
- 18) **Scheidt, RA**, Mussa-Ivaldi, FA & Ghez, C (2004) Different adaptive mechanisms for posture and movement control? *Proc. Neural Control of Movement Soc.*
- 17) **Scheidt, RA** & Mah, CD (2003) Feedforward control of virtual (isometric) reaching. *Abstr. of the Soc. for Neuroscience*, 29. New Orleans, LA.
- 16) Judkins, TN & **Scheidt, RA** (2003) Sensory coherence and memory-based motor adaptation. *Abstr. of the Soc. for Neuroscience*, 29. New Orleans, LA.
- 15) Lillis, KP & **Scheidt, RA** (2003) Hand path curvature sensitivity during reaching. *Abstr. of the Soc. for Neuroscience*, 29. New Orleans, LA.
- 14) Secco, EL, Scheidt, RA, Patton, J. & Mussa-Ivaldi, FA (2003) Misrepresentation of limb dynamics induced by the suppression of visual errors. *Abstr. of the Soc. for Neurosci.*, 29. New Orleans, LA.
- 13) Benz, E. **Scheidt, RA**, Schmit, BD (2003) Clinical Quantification of Spasticity In Individuals With Spinal Cord Injury. *Abstr. of the American Physical Therapy Association.*
- 12) **Scheidt, RA** Mah, CD and Mussa-Ivaldi, FA (2002) The role of concurrent sensory feedback in performing a virtual (isometric) reaching task. *Abstr. Soc. for Neuroscience*, 28, Orlando, FL.
- 11) Amir, H, **Scheidt, RA**, Kuiken, T (2002) Computerized Biofeedback Knee Goniometer: Acceptance and Effect on Exercise Behavior in Post Total knee Arthroplasty Rehabilitation. *Proceed. of the Association for Physical Medicine and Rehabilitation.*, 83: 1660-1661.
- 10) **Scheidt, RA**, Mussa-Ivaldi, FA and Mah, CD (2002) The role of concurrent sensory feedback in motor adaptation in a virtual (isometric) reaching task. *Abstr. Neural Control of Movement Soc.*
- 9) **Scheidt, RA**, Dingwell, JB. & Mussa-Ivaldi, FA. (2001) A linear systems approach to modeling motor adaptation. *Abstr. of the Soc. for Neuroscience.*, 27.
- 8) **Scheidt, RA**, Dingwell, JB. & Mussa-Ivaldi, FA. (2001) Internal model formation for control in stochastic environments. *Abstr. of the III International Symposium on Progress in Motor Control, Montreal, CA. p. 41.*
- 7) Dingwell, JB, Mah, CD, **Scheidt, RA** & Mussa-Ivaldi, FA. (2000) Do subjects learn feed-forward internal models when manipulating mass-spring objects? *Abstr. of the Soc. for Neuroscience*, 26(21)
- 6) **Scheidt, RA** & Mussa-Ivaldi, FA. (1999) Time series analysis of motor adaptation. *Abstr. of the Soc. for Neuroscience*, 25.
- 5) **Scheidt, RA**, Conditt, MA, Reinkensmeyer, DJ & Mussa-Ivaldi, FA. (1997) Motor adaptation persists in the absence of kinematic errors. *Abstr. of the Soc. for Neuroscience*, 23, 36.
- 4) Conditt, MA, **Scheidt, RA** & Mussa-Ivaldi, FA. (1997) Visual influence on learning arm dynamics. *Abstr. of the Soc. for Neuroscience*, 23, 36.
- 3) **Scheidt, RA** & Rymer, WZ. (1996) Single- and multi-joint arm movements: are they controlled the same way? *Abstracts of the Soc. for Neuroscience*, 22, 1640.
- 2) **Scheidt, RA**, Dewald, JP & Rymer, WZ. (1995) A time delay estimate of muscle EMG-to-force processing for use in the study of motor control. *Abstracts of the Soc. for Neuroscience*, 21, 681.25)
- 1) **Scheidt, RA**, & Kertesz, AE. (1992) Spatiotemporal aspects of sensory interactions during fusional response. *Investigative Ophthalmology & Visual Science*, 33(4), 1334.

Patents

- US Patent #6,292,692: "Medical treatment device with functions, operated under passcode control".
 US Patents #6,846,161 and #7,004,727: "Blood component processing systems and methods using fluid-actuated pumping elements that are integrity tested prior to use".

Invited Presentations

- "Control of limb posture and movement following stroke" Univ of Kentucky, Lexington, KY, 12/05/08.
 "Separate control of limb posture and movement in reaching" Univ of IL, Chicago, IL, 03/14/08.
 "Independent control of arm posture and movement in reaching: implications for the control of functional movement post-stroke." Cleveland Clinic Foundation, OH, 12/07/07.
 "Sensory information processing underlying adaptation of the human reach." Department of Bioengineering, Washington University, St. Louis, MO, 01/18/07.
 "Re-learning to move: adaptation of reaching movements post-stroke." Grand Rounds, Medical College of Wisconsin, Milwaukee, WI, 12/18/06.

“Visual and proprioceptive contributions to adaptation of the human reach.” Department of Kinesiology, Arizona State University, Phoenix, AZ, 11/22/06.

“Peripheral and central mechanisms for motor control.” Department of Neurology, Medical College of Wisconsin, Milwaukee, WI, 10/24/06.

“Adaptation of reaching movements post-stroke.” State of the Science (SOS) Workshop on Functional Restoration for the Stroke Survivor: Informing the Efforts of Engineers, San Diego, CA, 03/06/06.

“Independent planning of arm trajectory and posture during reaching.” Integrative Neuroscience Research Center, Marquette University, Milwaukee, WI, 12/05/05.

“Quantifying Motor Adaptation Following Stroke.” Centers for Research on Neurorehabilitation, Lake Bluff, IL, 06/12/04.

“Visual and proprioceptive contributions to posture and movement regulation in the upper extremity.” Northwestern University, Evanston, IL, 02/21/04.

“Memory-based trajectory adaptation in the upper extremity following stroke.” Rehabilitation Institute of Chicago, Chicago, IL, 02/20/04.

“Visual and proprioceptive contributions to the control and adaptation of reaching movements.” Rehabilitation Institute of Chicago, Chicago, IL, 12/18/03.

“Re-learning to move amid uncertainty: Quantifying motor adaptation following stroke.” Rehabilitation Institute of Chicago, Chicago, IL, 06/14/03.

“Reengineering biomedical engineering curricula: A new product development approach.” *Proceed. of the IEEE EMBS/BMES Soc.* Houston, Tx., 2002.

“Learning (and re-learning) to move amid uncertainty.” Univ. IL Chicago 03/08/02.

“A linear model of motor learning.” Neurosciences Institute, La Jolla, CA. 11/15/01.

“Systems identification of motor adaptation.” Johns Hopkins Univ., 02/12/00.

Professional Service

Co-editor: *Experimental Brain Research*; **Reviewer:** *Brain Research, IEEE Transactions on Neural and Rehabilitation Engineering, IEEE Transactions on Robotics, Neurosci. Letters, J. Applied Biomechanics, J. Motor Behavior, J. Neurophysiology, J. Neuroscience, J. Neuroscience Methods, Mathematical Bioscience, Nature Neuroscience, NeuroImage, Neuron, PLoS Biology, PLoS Computational Biology*

Grant Reviewer: NSF correspondent reviewer (Computational Neuroscience Program), 2001
 NIH panelist: 2002, 2005, 2007, 2008, 2009
 NSF panelist: 2003 through 2007
 Wellcome Trust (UK), 2007
 American Heart Association, 2008

Conference session organizer or chair: ICORR 2005, NCM 2005.
 Scientific Review Committee: ICORR 2007; IEEE EMBS 2007
 Social chair: SFN 2005.

University Service

Departmental: Undergraduate Laboratory Committee (Chair: 2002-present; member 2001)
 Undergraduate Curriculum Committee (member: 2001-2006; Chair: 2006-present)
 Departmental and Interdepartmental Faculty Search Committees (2002-present))

College: Mechanics Committee (member: 2001-2002)
 Technology Committee (member: 2006-2007)
 College Curriculum Committee (member: 2007-present)

Curriculum Developed

Embedded Biomedical Instrumentation (BIEN112): Development of embedded systems for the medical electronics industry (3 cr; junior standing)

Biocomputer Design Lab I: Physiological Simulation, Monitoring and Control (BIEN193): Small-scale computer-based medical systems; physiological monitoring and control (3 cr.; senior standing)

Neuromotor Control (BIEN237): Integration of control theory with the study of neuromotor control and movement biomechanics; study of normal and impaired human movement (3 cr; grad standing)

Microprocessor-based Biomedical Instrumentation (BIEN241): Application of microprocessors, microcontrollers, digital signal processors to biomedical applications (3 cr; grad standing)

Models and Mechanisms of Motor Learning (BIEN289): Examination of the role of variability in the planning and execution of upper extremity movements (3 cr; grad standing)

Research Methodologies I (BIEN289): Scientific proposal preparation (3 cr; grad standing)

Thesis And Dissertation Committees Chaired

Liu, Xiaolin, 2009, PhD – Biomedical Engineering. *Sensorimotor learning and the control of motion in a novel coordinate system* (committee chair).

Stoeckmann, Tina, 2007, DSc – Neurology (Rocky Mountain Univ. Health Professions) *Muscle recruitment and co-activation patterns in the spastic hemiparetic arm post-stroke: Effects of elastic, viscous, and mass loads* (committee chair).

Suminski, Aaron, A. 2006, PhD - Biomedical Engineering. *Contribution of Visual and Proprioceptive Sensory Feedback to the Online Regulation of Wrist Posture in Humans using fMRI* (committee chair)

Kanada, Priyanka, 2009 MS – Biomedical Engineering. *Spatial mapping of posture-dependent endpoint forces in the hypertonic arm post-stroke* (committee chair).

Amans, Matthew, 2008 MS – Biomedical Engineering. *Proprioceptive feedback contributions to the control of elbow extension movements in man: Modulating upper limb position sense via tendon vibration* (committee chair).

Asnani, Supriya, 2008 MS – Biomedical Engineering. *Interaction between the control of movement and posture during goal-directed elbow flexion.* (committee chair)

Judkins, Timothy N. 2004, MS - Biomedical Engineering. *Visual and proprioceptive contributions to adaptation of the human reach.* (committee chair)

Lillis, Kyle P. 2003, MS - Biomedical Engineering. *Proprioceptive sensitivity to hand path curvature during human reaching.* (committee chair)

I have also served on numerous other PhD and MS committees at Marquette University

Current Graduate Students

Nicole Gregor, PhD student – Biomedical Engineering (committee chair)
Maria Bengston, PhD student – Biomedical Engineering (committee chair)
Haswell, Timothy, MS student – Biomedical Engineering. (committee chair)

Post-Doctoral Fellows Supported and Trained

Dr. Janice Zimbelman, PT, PhD – Department of Neurology, Medical College of Wisconsin (2005-2008).
Dr. Lucia Simo, MD, PhD – Department of Physiology, Northwestern University (2008-present)