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BACKGROUND

EDUCATION & RESEARCH

B.S. in Psychology, Arizona State University, cum laude with Honors, 1987
Ph.D. in Neuroscience, University of Minnesota, 1994

August 1994 – July 1999: Post-doctoral fellow with Peter L. Strick, Ph.D. Studies focused on contribution of cerebellum and basal ganglia to cognitive processing.

June 1994 - August 1994: Post-doctoral fellow with John F. Soechting Ph.D. Completing thesis research projects

1988- June 1994: Graduate student in Neuroscience program at University of Minnesota
Advisors: John F. Soechting, Ph.D, and T.J. Ebner, M.D. Ph.D..

1987-1988: Research Assistant in Department of Neurobiology at Barrow Neurological Institute.
Mentor: James R. Bloedel, M.D. Ph.D.

1987-1988: Honor's student at Arizona State University
Mentors: Gregory O. Stone, Ph.D., Peter Killeen, Ph.D.

POSITIONS HELD

March 2006: Affiliated faculty, Dept. of Kinesiology, ASU

January 2006: Assistant Professor, Harrington Dept. of Bioengineering, ASU.

September 2004: Adjunct Faculty, Arts, Media, & Engineering Program, ASU.

July 2002 - March 2006: Research Associate, The Biodesign Institute, ASU.

July 2001 - December 2005: Research Assistant Professor, Harrington Dept. of Bioengineering

July 1999 - July 2001: Research Associate, Harrington Dept. of Bioengineering, ASU.

August 1994 - July 1999: Research Associate, Central New York Research Corporation.

PUBLICATIONS

PEER REVIEWED MANUSCRIPTS

1. Wahnoun R, J He, **SI Helms Tillery**. Selection and parameterization of cortical neurons for neuroprosthetic control (2006). *Journal of Neural Engineering*, **3**: 162-171
2. Fan J, J He, **SI Helms Tillery**. (2005) Hand orientation and the effect of target perturbation during reaching and grasping. *Experimental Brain Research*, Nov 24:1-14[ePub]
3. Tao K, J He, **SI Helms Tillery** (2005) Determining natural arm configuration along a reaching trajectory. *Experimental Brain Research*: 167(3): 352-381.
4. **Helms Tillery, SI**, DM Taylor (2004) Signal acquisition and analysis for cortical control of neuroprosthetics. *Current Opinion in Neurobiology*, **14**: 758-762.
5. Taylor DM, **SI Helms Tillery**, AB Schwartz (2003) Information conveyed through brain-control: cursor versus robot. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, **11**: 195-199.
6. **Helms Tillery SI**, DM Taylor, AB Schwartz (2003). Training in cortical control of neuroprosthetic devices improves signal extraction from small neuronal ensembles. *Reviews in the Neurosciences*, **14**: 107-119.
7. Taylor DM, **SI Helms Tillery**, AB Schwartz (2002). Direct cortical control of 3d neuroprosthetic devices. *Science*, **296**: 1829-1832.
8. Schwartz AB, D Taylor, **SI Helms Tillery** (2001). Extraction algorithms for cortical control of arm prosthetics. *Current Opinion in Neurobiology*, **11**: 701-707.
9. **Helms Tillery SI**, JF Soechting, TJ Ebner (1996). Somatosensory cortical activity in relation to arm posture: nonuniform spatial tuning. *Journal of Neurophysiology*, **76**: 2423-2438.
10. **Helms Tillery SI**, TJ Ebner, JF Soechting (1995). Task dependence of primate arm postures *Experimental Brain Research*, **104**: 1-11.
11. **Helms Tillery SI**, M Flanders, JF Soechting (1995). Errors in kinesthetic transformations for hand apposition. *NeuroReport*, **6**: 177-181.
12. Flanders M, **SI Helms Tillery**, JF Soechting (1991a). Early stages in a sensorimotor transformation. *Behavioral and Brain Sciences*, **15**: 309-362.
13. **Helms Tillery SI**, M Flanders, JF Soechting (1991b). A coordinate system for the synthesis of visual and kinesthetic information. *Journal of Neuroscience*, **11**: 770-778.
14. Soechting JF, **SI Helms Tillery**, M Flanders (1990). Transformation from head- to shoulder-centered representation of target direction in arm movements. *Journal of Cognitive Neuroscience*, **2**:32-43.
15. **Tillery SI**, BE Lehnert (1986). Immunohistological identification of Factor VIII related antigen in frozen sections of rat lung. *Laboratory Animal Science*, **36**:65-67.
16. **Tillery SI**, BE Lehnert (1986). Age-body weight relationships to lung growth in Fischer-344 rats as indexed by lung-weight measurements. *Laboratory Animals*, **20**: 189-194.

BOOK CHAPTERS

1. Middleton FA, **SI Helms Tillery** (2002) The cerebellum. *Encyclopedia of Cognitive Science*, L Nadel (ed).
2. Bloedel JR, **SI Helms Tillery** (1990). Effect of practice on the kinematics of reaching

movements made to moving targets. In: *Tutorials in Motor Science*, J Requin and GE Stehlmach eds., Kluwer Academic Publishers, Dordrecht.

INVITED LECTURES

1. "Cortical Neuroprosthetics at ASU: State of the art and future directions" WestBEC 2006. Phoenix, AZ. November 10, 2006.
2. "Decoding for recoding: Neural signals for neuroprosthetics." ASU/BNI 1st Annual Neurosciences Symposium. Phoenix, AZ. November 4, 2006.
3. "Cortically controlled neuroprosthetics." Instituto Politecnico Nacional, Mexico City, MX, October 5, 2006.
4. "Cortical neuroprosthetics." Tecnologico de Monterrey, Monterrey, MX. April 1, 2006
5. "Multi-channel recording in the primate basal ganglia: methods for DBS implant" Mayo Clinic, Scottsdale, AZ. October 5, 2005.
6. "Neuroprosthetics at Arizona State University." Video lecture to Tecnologico de Monterrey, Monterrey, MX. September 22, 2005.
7. "Music and the brain." Arizona Science Center, Adults' Night Out. June 2, 2005.
8. "Issues in cortical neuroprosthetic design". Harrington Dept. of Bioengineering Lecture series, Arizona State University. March 4, 2005.
9. "The basal ganglia contribution to ... ". Doings. University of Arizona Dept. of Physiology. March 20, 2004.
10. "Your brain on music." Art Ventures in Engineering, Arizona State University and the City of Tempe. March 13, 2004.
11. "Cortically controlled neuroprosthetics at ASU". President's Community Enrichment Programs, Journeys of the Mind. ASU Foundation. March 10, 2004.
12. "Physiological evidence for closed- and segregated-loops in basal ganglia." Neuroscience Seminar Series, Barrow Neurological Institute. January 27, 2004.
13. "Correlated activity between nuclei of the basal ganglia." Harrington Dept. of Bioengineering Lecture Series. October 10, 2003.

PRESENTATIONS AT PROFESSIONAL MEETINGS

1. Hunn D, **SI Helms Tillery** (2006) A comprehensive simulation of the primate basal ganglia. *WestBEC 2006*.
2. Mirtalaei S, **SI Helms Tillery** (2006) Optimization of data processing for use in neural interfaces. *WestBEC 2006*.
3. Rincon L., DA Diaz, JP Warren, SI Helms Tillery, M Santello (2006) The effect of tactile and electrotactile stimulation on the estimate of hand location. *WestBEC 2006*.
4. Warren JP, LM Raleigh, **SI Helms Tillery**, M Santello, JD Sweeney (2006) Effect of electrode size, spacing, and frequency of electrotactile stimuli on tactile sensation and spatial discrimination on the fingertip. *WestBEC 2006*.
5. Hunn D, **SI Helms Tillery** (2006) A comprehensive simulation of the basal ganglia. *1st Annual ASU/BNI Neurosciences Symposium*.
6. Wahnoun R, J He, **SI Helms Tillery** (2006) Motor cortical unit behavior under two alternating tasks in a virtual reality environment. *Society for Neuroscience 36th Annual Meeting Abstracts*.

7. Warren JP, LM Raleigh, **SI Helms Tillery**, M Santello, JD Sweeney (2006) Effect of electro tactile stimulus parameters on tactile sensation and spatial discrimination. *Society for Neuroscience 36th Annual Meeting Abstracts*.
8. He J, J Fan, **SI Helms Tillery** (2006) Motor cortical encoding of planned hand orientation in a 3-d reach-to-grasp task. *Society for Neuroscience 36th Annual Meeting Abstracts*.
9. Raleigh LM, JP Warren, **SI Helms Tillery**, M Santello, JD Sweeney (2005) Comparison of discriminability in electro tactile and mechanical stimulation of the fingertip. *Society for Neuroscience 35th Annual Meeting Abstracts*.
10. Kiggins, J, T Ingalls, J James, M Santello, **SI Helms Tillery** (2005) Bow-arm kinematics in trained and untrained violin playing. *The Neurosciences and Music, II*.
11. Wahnoun R, **SI Helms Tillery**, J He (2003). Assessing the amount of cortical learning in neural control of prosthetics. *Society for Neuroscience 33rd Annual Meeting Abstracts*.
12. Taylor DM, **SI Helms Tillery**, AB Schwartz (2003). Information transfer rates in brain-machine interfaces. *Society for Neuroscience 33rd Annual Meeting Abstracts*.
13. **Helms Tillery SI**, J Parks (2003). Identified functional connectivity between cortical neurons and elements of basal ganglia. *Society for Neuroscience 33rd Annual Meeting Abstracts*.
14. **Helms Tillery SI**, DM Taylor, AB Schwartz (2003). The general utility of a neuroprosthetic device under direct cortical control. *Proceedings of the Engineering in Medicine and Biology 25th Annual Meeting*.
15. Fan J, **SI Helms Tillery**, J He (2003). Hand orientation and perturbation effects during reach and grasp. *Proceedings of the Engineering in Medicine and Biology 25th Annual Meeting*.
16. Tao K, **SI Helms Tillery**, J He (2003). Determining natural arm configuration along reaching trajectory. *Proceedings of the Engineering in Medicine and Biology 25th Annual Meeting*.
17. Lin WS, **SI Helms Tillery**, J He (2003). Stability of chronic multichannel neural recordings. *Proceedings of the Engineering in Medicine and Biology 25th Annual Meeting*.
18. **Helms Tillery SI**, DM Taylor, AB Schwartz (2002). A maximum likelihood measure applied to signals used in controlling a neural prosthesis. *Society for Neuroscience Annual Meeting Abstracts*.
19. **Helms Tillery SI**, PR Rousche, K Hausmann, D Hall, A Panitch, M Beaumont, DR Kipke (2001). Nerve growth factor dependent changes in electrophysiology measured in a neurotrophic electrode. *Proceedings of the Engineering in Medicine and Biology 22nd Annual Meeting*.
20. Hausmann K, M Beaumont, SE Sakyima-Elbert, DR Kipke, A Panitch (2001) Physiological evidence for the efficacy of NGF-fibrin as a bioactive electrode media. *Biomedical Engineering Society Annual Meeting Abstracts*. (K Hausmann is a student under my supervision).
21. **Helms Tillery SI**, WS Lin, AB Schwartz (2001) Stimulus-response matching in training primates to use a neuroprosthetic device. *Society for Neuroscience Annual Meeting Abstracts*.
22. **Helms Tillery SI**, DM Taylor, R Isaacs, AB Schwartz (2000). Online control of a prosthetic arm from motor cortical signals. *Society for Neuroscience Annual Meeting Abstracts*
23. **Helms Tillery SI**, TJ Ebner, JF Soechting (1994). Differential processing of vertical and horizontal components of arm posture in SI. *Society for Neuroscience Annual Meeting Abstracts*.
24. **Helms Tillery SI**, JF Soechting, TJ Ebner (1992). Discharge of parietal cortical neurons during a variety of hand and arm tasks. I. General Characteristics. *Society for Neuroscience Annual Meeting Abstracts*.
25. Soechting JF, **SI Helms Tillery**, TJ Ebner (1992). Discharge of parietal cortical neurons during a variety of hand and arm tasks. II. Quantitative Analysis. *Society for Neuroscience Annual Meeting Abstracts*.

26. Soechting JF, M Flanders, **SI Tillery** (1989) Sensorimotor transformations for arm movements: serial and parallel processes. *Society for Neuroscience Annual Meeting Abstracts*.
27. Bloedel JR, **SI Tillery**, AJ Pellionisz (1988). Experimental-theoretical analysis of the intrinsic geometry of limb movements. *Society for Neuroscience Annual Meeting Abstracts*.
28. **Tillery SI**, JR Bloedel (1988). Effects of repetition on arm trajectories directed towards moving targets. *Society for Neuroscience Annual Meeting Abstracts*.
29. **Tillery SI**, NH Combs (1987). The problem of internal representations: concepts, implications, and a proposed metric. *First International Congress on Neural Networks Abstracts*.
30. Kowluru A, BE Lehnert, RA Kowluru, **SI Tillery**, MW Bitensky (1986). Effects of hyperglycemic glucosylation on alveolar macrophage cytoskeleton and function. *Endocrine Society Annual Meeting*.
31. Lehnert BE, RA Kowluru, A Kowluru, **SI Tillery**, MW Bitensky (1985). Alterations in alveolar macrophage cytoskeletal proteins and functions during Diabetes Mellitus. *American Thoracic Society Meeting*.
32. **Tillery SI**, ML Cheal (1985). Development of attention in the Mongolian Gerbil: facilitation by eye-opening. *American Psychological Ass Abstracts*

MANUSCRIPTS SUBMITTED OR IN PREPARATION

1. Raleigh LM, J Warren, **SI Helms Tillery**, M Santello, JD Sweeney. Discriminability of electrical and mechanical stimulation delivered to the fingerpad. *Under Review*.
2. Warren J, LM Raleigh, **SI Helms Tillery**, JD Sweeney, M Santello. Electrical stimulation of the skin as a sensory input. *Under Review*.
3. **Helms Tillery SI**, T Ingalls, J James, M Santello. Kinematics of bow control in skilled and unskilled violin playing. *In preparation*.
4. Stukel JM, JP Parks, MR Caplan, **SI Helms Tillery**. Temporal and spatial control of neural effects following intracerebral microinfusion. *Under Review*

OTHER PUBLICATIONS

1. **SI Helms Tillery** (2002). An incident while enjoying life – on the edge. *AZ Mountaineer*, Feb., 2003. [description of a climbing trip with potentially deadly situation]
2. **S. Tillery** (1996) Animal research is a key part of medical discovery process, Guest Editorial, *Syracuse Post-Standard*, July 22.
3. Steinmetz PN, **SI Helms Tillery** (1994) Animal models: some empirical worries. *Public Affairs Quarterly*, 8(3): 287-298. [An analysis of common antivivisectionist claims, published in rebuttal to a previous *PAQ* paper].

RESEARCH SUPPORT

EXTRAMURAL FUNDING

1. Cortical control of a dextrous prosthetic hand. NIH Bioengineering Research Partnership. ASU PI, Co-PI Dr. Marco Santello. First year support: \$226,537. Total support over 5 years: \$1,200,178. 9/16/07-8/31/11.
2. PharmaScan 70/16 In-Vivo Spectroscopy/Imaging System. NIH NCRR High End Instrumentation Program. R. Jung (PI). \$809,550.
3. Teaming plan for revolutionizing prosthetics. DARPA/USC/JHUAPL Consortium, J He (PI): \$908,909.
4. Cortical control of neural prostheses. NIH Subcontract. Overall PI: A.B. Schwartz. Total support: \$10,260. Effort: 0%.

INTRAMURAL FUNDING

1. High density neural recordings for DBS mapping studies. ASU/Mayo seed grants, V. Evidente (PI). One year support: \$31,400

TEACHING

CLASSES

- BME 598: Human Systems Neuroscience
- BME 598: Cellular & Molecular Neuroscience
- BME 598: Special Topics: Readings in neurophysiology

MENTORING

DOCTORAL

Current

- Nathan Baldwin. Ph.D. Bioengineering. IGERT Fellowship awardee. Effect of muscimol injection in putamen on activity in cerebral cortex.
- David Meller. Ph.D. Bioengineering. Neuroprosthetic control of hand and finger movements.

MASTERS

Current

- David Hunn. M.S. Bioengineering. Current injection induced by set amounts of neuroactive agents such as muscimol

2006

- Jason Parks. M.S Bioengineering. "Drug injection modeling for basal ganglia recordings." April, 2006.

2004

- Kara Hausmann. Thesis Title: Efficacy of brain-derived neurotrophic factor in chronic neural micro-electrodes. Subsequent position: Research Associate,

University of Colorado Health Sciences Center, Denver, CO.

UNDERGRADUATE

Current:

- Maria Bengtson. Junior Bioengineering. FURI Undergraduate Fellowship awardee. Control of bow motion in violin playing
- Lachlan Franquemont. Sophomore, Psychology. Control of hand movement
- Liliana Rincon. Junior Bioengineering. FURI Undergraduate Fellowship awardee. Control of finger movement

2005

- Jennifer Schumacher. Capstone project: A captive neuron biosensor. Subsequent position: Ph.D. Program in Neuroscience, University of Minnesota

SERVICE

NATIONAL SERVICE

Ad-hoc manuscript review

- Brain Research
- Experimental Brain Research
- IEEE Transactions on Biomedical Engineering
- Journal of Neural Engineering
- Journal of Neurophysiology
- Proceedings of the National Academy of Science
- Proceedings of the Royal Society of London, Series B

Specific Manuscript Reviews:

Oct. 15, 2006 *Journal of Neural Engineering*
Sept. 27, 2006 *Experimental Brain Research*
August 18, 2006 *Experimental Brain Research*
March 15, 2006 *Experimental Brain Research*
Feb 23, 2006 *Experimental Brain Research*
Sept. 25, 2005 *Brain Research*
Sept. 21, 2005. *Brain Research*
Jan 31, 2005. *Brain Research*
Sept. 15, 2004. *Brain Research*

Standing proposal review

- NIH NRSA Review panel: ZRG1 F01-R (20) L: Brain Disorders and Clinical Neuroscience Fellowships
- NIH Special Emphasis panel: BDCN K-10: Clinical Neurophysiology, Devices, and Neuroprosthetics/Brain Disorders and Clinical Neurosciences/SBIR

Ad-hoc proposal review

- Israel Science Foundation. February 2006
- Research Grants Council of Hong Kong. February, 2006.
- Dutch Social Science Research Council NWO Competitive Reviews, 2004.

COLLEGE/UNIVERSITY SERVICE

- Member, IAFSOE Sabbatical Request Committee

DEPARTMENT SERVICE

- Member, Harrington Dept. of Bioengineering Graduate Committee

PROFESSIONAL AWARDS AND AFFILIATIONS

HONORS AND AWARDS

- 1995-1997: National Association for Research in Schizophrenia and Depression Young Investigator Grant Award.
- 1995: Bacanar Research Award for Outstanding Dissertation.
- 1989-1993: NSF Graduate Fellowship.
- 1988-1989: University of Minnesota Graduate Fellowship
- 1987-1988: Clerkship at Barrow Neurological Institute, Phoenix, AZ
- 1982-1987: Violin scholarship, Arizona State University

PROFESSIONAL MEMBERSHIPS

- Society for Neuroscience
- International Basal Ganglia Society
- Society for the Neural Control of Movement
- The Performing Arts Medicine Association
- New York Academy of Sciences