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EDUCATION

Ph.D.	Kinesiology	The Pennsylvania State University	2009
M.S.	Kinesiology	University of Illinois at Urbana-Champaign	2005
B.E.	Electronics & Communication Engineering	Sri Venkateswara College of Engineering University of Madras, India	2003

RESEARCH EXPERTISE

- Motor learning, Motor Redundancy, Motor variability, Neurorehabilitation, Human-Machine Interfaces

PROFESSIONAL EXPERIENCE

- Assistant Professor, Departments of Kinesiology and Mechanical Engineering, Michigan State University. 2014 –
- Research Assistant Professor, Department of Physical Medicine and Rehabilitation, Northwestern University, 2012-2014
- Research Associate, Rehabilitation Institute of Chicago, 2009-2012

HONORS & AWARDS

Academic Honors

- Alumni Association Dissertation Award, The Pennsylvania State University, 2009
  (Awarded to the top 13 students in the University that year)
- Kligman Graduate Fellowship, The Pennsylvania State University, 2008-2009
  (Awarded to the top 3 students in the College of Health and Human Development)
- University Graduate Fellowship, The Pennsylvania State University, 2005-2006
- Carol Chittenden Fellowship, University of Illinois at Urbana-Champaign, 2003-2005

Awards

- Sarah Baskin Award for Research Excellence, Rehabilitation Institute of Chicago, 2012
- Conference Scholarship, Progress in Motor Control, Cincinnati OH, 2011

TEACHING

- Course Instructor, Biomechanics of Physical Activity. (KIN 330). Michigan State University, Spring 2014

  Duties involved developing course content as well as handling lectures and lab sessions (class size: 62 students).

GRANTS

- National Institutes of Health. Functional Reorganization of Finger Movements to Improve Hand Dexterity (NICHD R03HD069806). Jul 2012-2014. **Role: PI.** $147,150

  The proposal aims to improve hand function in chronic stroke patients by facilitating the practice of novel finger coordination patterns.

PUBLICATIONS

Peer-Reviewed Journal Articles

1. Krishnan, C., **Ranganathan, R.**, Kantak, S. S., Dhaher, Y. Y., & Rymer, W. Z. (2014). Anodal transcranial direct current stimulation alters elbow flexor muscle recruitment strategies. *Brain Stimulation*. Epub ahead of print.
2. Krishnan, C., **Ranganathan, R.,** Dhaher, Y. Y., & Rymer, W. Z. (2013). A pilot study on the feasibility of robot-aided leg motor training to facilitate active participation. PLoS ONE, 8(10), e77370.
3. **Ranganathan, R.,** Adewuyi, A. & Mussa-Ivaldi, F. A. (2013). Learning to be lazy: Exploiting redundancy in a novel task to minimize movement-related effort. *Journal of Neuroscience, 33,* 2754-2760*.*
4. **Ranganathan, R.***,* & Newell, K. M. (2013). Changing up the routine: Intervention-induced variability in motor learning. *Exercise and Sport Sciences Reviews, 41,* 64-70.
5. Casadio, M.*,* **Ranganathan, R.,** & Mussa-Ivaldi, F. A (2012). The body-machine interface: A new perspective on an old theme. *Journal of Motor Behavior, 44,* 419-433*.*
6. King, A. C., **Ranganathan, R.,** & Newell, K. M. (2012). Individual differences in the exploration of a redundant space-time motor task. *Neuroscience Letters, 529,* 144-149*.*
7. Krishnan, C., **Ranganathan, R.*,** Kantak, S. S., Dhaher, Y. Y., & Rymer, W. Z. (2012). Active robotic training improves locomotor function in a stroke survivor. *Journal of Neuroengineering and Rehabilitation, 9,* 57. (* indicates co-first author)
8. **Ranganathan, R.,** & Krishnan, C. (2012). Extracting synergies in gait: Distinguishing neural

organization from task-related activity. *Journal of Neurophysiology*, *108,* 1537-1544*.*

9. **Ranganathan, R.**, Lee, M. H., Brown, A. J., & Newell, K. M. (2011). Grasping possibilities for action: Influence of object function and action capabilities. *Human Movement Science, 30,* 1102-1114*.*
10. Lee, M. H., **Ranganathan, R.**, & Newell, K. M. (2011). Changes in object-oriented arm movements that precede the transition to goal-directed reaching in infancy. *Developmental Psychobiology, 53,* 685-693*.*
11. **Ranganathan, R.**, & Newell, K. M. (2010). Motor learning through induced variability at the task goal and execution redundancy levels. *Journal of Motor Behavior, 42,* 307-316*.*
12. **Ranganathan, R.** & Newell, K. M. (2010). Emergent flexibility in motor learning. *Experimental Brain Research, 202,* 755-764*.*
13. **Ranganathan, R.** & Newell, K. M. (2010). Influence of motor learning on utilizing path redundancy. *Neuroscience Letters, 469,* 416-420*.*
14. **Ranganathan, R.,** & Newell, K. M. (2009). Influence of augmented feedback on coordination strategies. *Journal of Motor Behavior, 41,* 317-330*.* Erratum in 42(3), 195-195.
15. **Ranganathan, R.**, & Newell, K. M. (2008). Online feedback and the regulation of degrees of freedom in motor control. *Human Movement Science, 27,* 577-589.
16. **Ranganathan, R.**, & Newell, K. M. (2008). Motor synergies: Feedback and error compensation within and between trials, *Experimental Brain Research, 186,* 561-570.
17. **Ranganathan, R.**, & Carlton, L. G. (2007). Perception-action coupling and anticipatory performance in baseball batting. *Journal of Motor Behavior, 39,* 369-380.
18. Fleisig, G. S., Kingsley, D. S., Loftice, J. W., Dinnen, K. P., **Ranganathan, R.**, Dun, S. Escamilla, R. F., & Andrews, J. R. (2006). Kinetic comparison among the fastball, curveball, change-up, and slider in collegiate baseball pitchers. *American Journal of Sports Medicine, 34*, 423-430.

Book Chapters/Editorials

19. Mussa-Ivaldi, F. A., Casadio, M., & **Ranganathan, R.** (2013). The body-machine interface: a pathway for rehabilitation and assistance in people with movement disorders. *Expert Reviews of Medical Devices, 10,* 145-147.
20. Newell, K. M., & **Ranganathan, R.** (2010). Instructions as constraints in motor skill acquisition. In I. Renshaw, K. Davids, & G. J. P. Savelsbergh (Eds.), *Motor Learning in Practice: A constraints-led approach (pp. 17-32)*. London: Routledge.
21. Newell, K. M., & **Ranganathan, R.** (2009). Some contemporary issues in motor learning. In D. Sternad (Ed.), *Progress in motor control – A multidisciplinary perspective (pp. 395-404).* Berlin: Springer.

CONFERENCE PRESENTATIONS

Podium Presentations

1. **Ranganathan, R.,** & Newell, K. M. Is reduction in movement variability a sign of optimization?

NASPSPA, Tucson, AZ, 2010.

2. **Ranganathan, R.,** & Newell, K. M. Concurrent feedback and learning: Insights from variability of degrees of freedom. *NASPSPA*, Niagara Falls, ON, 2008.
3. **Ranganathan, R.,** & Newell, K. M. Feedback and error compensation in isometric force production. *North-East American Society of Biomechanics*, University of Maryland, College Park, MD, 2007.
4. **Ranganathan, R.,** & Carlton, L. G. Perception-action coupling and anticipatory performance in baseball batting. *NASPSPA*, Denver, CO, 2006.

Poster Presentations

5. **Ranganathan, R**., & Gothuey, F. Eliciting novel patterns of finger coordination using body-machine interfaces. *Society for Neuroscience*, San Diego CA, 2013.
6. Lee, M. H., Farshschiansadegh, A., & **Ranganathan, R.** Designing practice schedules to optimize motor learning in body-machine interfaces. *Society for Neuroscience*, San Diego, CA, 2013.
7. Farshschiansadegh, A., **Ranganathan, R.,** Casadio, M., & Mussa-Ivaldi, F. A. Adaptation to visual feedback delay in a redundant motor task. *Society for Neuroscience*, San Diego, CA, 2013.
8. Krishnan, C., **Ranganathan, R.**, Kantak, S., Dhaher, Y. Y., & Rymer, W. Z. Anodal transcranial direct current stimulation alters elbow flexor muscle recruitment strategies. *Society for Neuroscience*, San Diego, CA, 2013.
9. **Ranganathan, R.**, Farshschiansadegh, A., Scheidt, R. A., & Mussa-Ivaldi, F. A. Implicitly eliciting changes in finger coordination patterns. *Society for Neuroscience*, New Orleans, LA, 2012.
10. Krishnan, C., **Ranganathan, R**., Dhaher, Y. Y., & Rymer, W. Z. Learning new gait patterns: Muscle activity during exploratory behavior is not predicted by muscle synergies from steady-state walking. *Society for Neuroscience*, New Orleans, LA, 2012.
11. **Ranganathan, R.**, Wieser, J., Mosier, K. M., Mussa-Ivaldi, F. A., & Scheidt, R. A. Learning finger coordination patterns by altering dimensionality. *Neural Control of Movement*, Venice, Italy, 2012.
12. Krishnan, C., **Ranganathan, R.**, Kantak, S. S., Landry, J., Dhaher, Y. Y., & Rymer, W. Z. Patient cooperative robotic training improves locomotor function in stroke survivor. *Combined Sections Meeting APTA*, Chicago, IL, 2012.
13. **Ranganathan, R**., Wieser, J., & Scheidt, R. A. Reduced dimensionality training and learning of finger coordination patterns. *Society for Neuroscience*, Washington DC, 2011.
14. **Ranganathan, R.,** Adewuyi, A., & Mussa-Ivaldi, F. A. Exploiting redundancy when forming a new map. *Progress in Motor Control*, Cincinnati, OH, 2011.
15. Krishnan, C., **Ranganathan, R.**, Kantak, S. S., Landry, J., Dhaher, Y. Y., & Rymer, W. Z. Active robot training with visual feedback improves gait function after stroke: A case study. *Progress in Motor Control*, Cincinnati, OH, 2011.
16. Casadio, M., Pressman, A., Danziger, Z., Acosta, S., Tseng, H., Muir, K., Chen, D., **Ranganathan, R.**, Kolesnikov, M., Fishbach, A., & Mussa-Ivaldi, F. A. Body-machine interface for controlling

assistive devices after spinal cord injury. *Society for Neuroscience,* San Diego, CA, 2010.

17. **Ranganathan, R.,** Danziger, Z., Eccarius, P., Scheidt, R. A., Mosier, K. M., & Mussa-Ivaldi, F. A. Remapping hand movements: Exploiting redundancy in hand postures. *Society for Neuroscience*, San Diego, CA, 2010.
18. **Ranganathan, R**., & Newell, K. M. Inducing variability in motor learning: Optimization and flexibility. *Society for Neuroscience*, Chicago, IL, 2009.
19. **Ranganathan, R.,** & Newell, K. M. Utilizing redundant solutions in motor learning. *Progress in Motor Control,* Marseille, France, 2009.
20. **Ranganathan, R**., & Newell, K. M. Influence of constant and variable practice on spatial variability. *NASPSPA*, Austin, TX, 2009.
21. **Ranganathan, R.,** & Newell, K. M. Learning a redundant task: Practicing single and multiple solutions. *Society for Neuroscience*, Washington, DC, 2008.
22. **Ranganathan, R.,** & Newell, K. M. Feedback and learning strategies: Influence of concurrent and outcome feedback. *Society for Neuroscience*, San Diego, CA, 2007.
23. **Ranganathan, R.,** & Newell, K. M. Influence of feedback on degrees of freedom. *NASPSPA*, San Diego, CA, 2007.
24. Terando, M., **Ranganathan, R.,** & Carlton, L. G. Projectile motion: The effects of relative release height and target distance on release parameters. *NASPSPA*, San Diego, CA, 2007.
25. **Ranganathan, R.,** & Newell, K. M. Across-trial and within-trial compensation in isometric force production. *Coordination Dynamics*, Boca Raton, FL, 2007.
26. **Ranganathan, R.,** & Carlton, L.G. Perception-action coupling in baseball batting: Evidence for similar coupling of temporal parameters in experts and novices. *Society for Neuroscience*, Atlanta, GA, 2006. (*Among 5% of abstracts at the conference selected for a lay-language summary*.)

INVITED TALKS

Research Talks

1. "Motor control: Linking theory and practice". Department of Physical Medicine and Rehabilitation. *Michigan State University*. Mar 2014.
2. "Body-Machine interfaces for studying motor learning". College of Sports and Recreation. *National Taiwan Normal University*, Taipei, Taiwan. Aug 2013.
3. "Exploring the role of variability in motor learning". Department of Applied Mechanics**.** *Indian Institute of Technology-Madras*, Chennai, India. Aug 2010.
4. "Exploring the role of variability in motor learning". Centre for Neuroscience*. Indian Institute of Science,* Bangalore, India. Aug 2010.

General Talks

1. "Introduction to human movement science". Talk given to high school students highlighting the importance of physical activity and ongoing research in human movement science**.** *Bala Vidya*

Mandir High School, Chennai, India. Jan 2012.

REVIEWING

Journals Reviewed for

Neuroscience/Motor Control Experimental Brain Research, Frontiers in Human Neuroscience, Human Movement Science, Journal of Motor Behavior, Journal of Neuroscience, Journal of Neurophysiology, Motor Control, PLoS Computational Biology, PLoS ONE

Biomedical Engineering/Rehabilitation European Journal of Physical Rehabilitation and Medicine, IEEE Conference Proceedings on Rehabilitation Robotics, IEEE Transactions on Neural Systems & Rehabilitation Engineering, Presence: Teleoperators and virtual environments

Psychology/Exercise & Sport Science Attention, Perception, & Psychophysics, Journal of Experimental Psychology: Applied, Perceptual and Motor Skills, Research Quarterly for Exercise and Sport, Sports Biomechanics

Grants

Ad-hoc reviewer, National Science Foundation – *Perception, Action, and Cognition Program.* Mar 2014

PROFESSIONAL MEMBERSHIP

- Society for Neuroscience
- North American Society for the Psychology of Sport and Physical Activity (NASPSPA)
- International Society of Motor Control

PROFESSIONAL SERVICE

Actively involved in disseminating research to the public through lab tours and demonstrations. Especially involved in contributing to programs promoting the importance of science education.

- Judge, VEX Robotics competition – an event aimed at encouraging middle and high school students to become engaged in STEM fields through the use of robotics. *Michigan State University.* Mar 2014
- Judge, University Undergraduate Research and Arts Forum (UURAF) – annual event where undergraduates showcase their scholarship and creative activity. *Michigan State University*. Apr 2014

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