

## CURRICULUM VITAE

Name: Kenneth G. Holt, PhD., P.T.

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Education Program: Physical Therapy Program

Department of Physical Therapy and Athletic Training  
Sargent College of Health and Rehabilitation Sciences  
Boston University  
635 Commonwealth Avenue, Boston, MA 02215

### EDUCATION:

<u>Institution</u>	<u>Dates</u>	<u>Field of study</u>	<u>Degree</u>
U. of Massachusetts (Amherst, MA)	1985-1989	Exercise Science (Biomechanics/Ergonomics) Advisor: Dr. Robert Andres, PhD, CPE	PhD
Boston University (Boston, MA)	1981-1983	Physical Therapy	MSPT
U. of Connecticut (Storrs, CT)	1978-1980	Biobehavioral Science (Motor Control) Advisor: Dr. Scott Kelso, PhD	PhD study
Penn State University (University Park, PA)	1976-1978	Physical Education (Motor Control) Advisor: Dr. Robert Christina, PhD	MS
Nottingham University (England)	1969-1973	Education, Physical Education, Mathematics	BEd Cert. Ed.

### LICENSURE:

Physical Therapy: MA #5037

### EMPLOYMENT:

<u>Dates</u>	<u>Employer</u>	<u>Position</u>
<b>Academic and Research Positions</b>		
April 2013	University of Minas Gerais Brazil	Visiting Scholar
2012- present	Wyss institute Harvard University	Visiting Professor
1995-present	Boston University Boston, MA	Tenured Associate Professor Director, Barreca Motion Analysis Lab.
1995-present	Boston University Boston, MA	Faculty, Program in Neuroscience

1989-1995	Boston University Boston, MA	Assistant Professor (Tenure Track) Director, Barreca Musculoskeletal Lab.
1985-1986	U. of Massachusetts Amherst, MA	Research Assistant
1978-1980	Haskins Laboratories Storrs, CT	Research Assistant
1978	University of Iowa Iowa City, IA	Research Assistant
1976-1978	Southwest Missouri State U. Springfield, MO	Faculty/Instructor
1975-1976	Penn State University University Park, PA	Research Assistant
1973-1974	Nottinghamshire Education Committee, England	High School Teacher

### **Clinical Positions**

May 1994-present	Self-Employed	Physical Therapist
Sept 1989-1995	Boston University Boston, MA	PT Consultant
Jan-May 1986	U. of Massachusetts Amherst, MA	Acting Director Physical Therapy Dept.
1984-1989	U. of Massachusetts Amherst, MA	Staff Physical Therapist
1982-1983	Boston University Boston, MA	Student PT Clinic Director, Public Relations

### **Administrative Positions**

Sept 2001-2003	Boston University. Boston, MA	Director, Movement and Rehabilitation Sciences
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### **PEER REVIEWED PUBLICATIONS:**

#### **Full Scientific Publications: Refereed**

Asbeck, A. DeRossi, MM. **Holt, KG.** Walsh CJ. (accepted with revisions) A Biologically-Inspired Soft Exosuit for Walking Assistance. *International Journal of Robotics Research*.

Monaghan, G. Hsu, W-H. Lewis CL, Saltzman E, Hamill J, **Holt KG** (in press, 2014). Forefoot angle determines duration and amplitude of pronation during running. *Clinical Biomechanics*

Caron, R. Lewis, CL. Saltzman E. Wagenaar, RO. **Holt, KG.** (accepted with revisions) Musculoskeletal

stiffness changes linearly in response to increasing load during walking gait. *Journal of Biomechanics*

Hsu WH, Monaghan, GM, Lewis, CL, Saltzman, E, Hamill, J, **Holt, KG** (2014). Orthoses posted in both the forefoot and rearfoot reduce moments and impulses on lower extremity joints during walking *Journal of Biomechanics* 47 2618-2625.

Saltzman, E., & **Holt, KG** (2014). Movement forms: A graph-dynamic perspective. *Ecological Psychology*

DeSilva JM, **Holt, KG**, Churchill, SE, Carlson, KJ, Walker, CS, Zipfel, B, Berger, L (2013)  
The Lower Limb and Mechanics of Walking in *Australopithecus sediba*, *Science* 340(6129):1232999

Caron RR Wagenaar, RC Lewis, CL Saltzman E, **Holt KG** (2013) Forward lean maintains center of mass trajectory and orientation to ankle and knee in sagittal plane with increasing backpack load during walking *Journal of Biomechanics* 46(1):70-76

Monaghan, G. Lewis CL Hsu, W-H, Saltzman E, Hamill J, **Holt KG** (2013) Forefoot angle determines duration and amplitude of pronation during walking. *Gait and Posture*, 38(1):8-13.

Wehner, M, Quinliven, B, Aubin, PM, Martinez-Villalpando, E, Bauman, M, Stirling, L, **Holt, KG**, Wood, RJ, Walsh, C. (2013) Design and evaluation of a lightweight soft exosuit for Gait Assistance. Proceedings IEEE International Conference on Robotics and Automation

Goldfield, EC, Park, Y-L, Chen, B-R, Hsu, WH, Young, D, Wehner, M, Kelty-Stephen, DG, Stirling, L, Weinberg, M, Newman, D, Nagpal, N, Saltzman, E. **Holt, KG**, Walsh, C, Wood, RJ (2012). Bio-inspired design of soft orthotic devices: The interface of Physics, Biology, and Behavior. *Ecological Psychology*, 24:300-327.

Stephen, DG, Hsu, WH, Saltzman, E, **Holt, KG**, Newman, DJ, Weinberg, M, Wood, RJ, Nagpal, R, Young, Goldfield, EC. (2012) Multifractal fluctuations in joint angles during infant spontaneous kicking reveal multiplicity-driven coordination" *Chaos, Solitons, & Fractals*, 45 1201-1219.

Cauraugh, JH, Naik, SK, Hsu, WH, Coombes, SA, **Holt, KG** (2010) Children with cerebral palsy: a systematic review and meta-analysis on gait and electrical stimulation. *Clinical Rehabilitation*,

Gross, KD, Niu, J., Zhang, YQ, Felson, DT, McLellan, C Hannan, MT, **Holt, KG**, Hunter, DJ (2008) The Varus Foot and Hip Conditions In Older Adults. *Arthritis and Rheumatism*. 56 (9) 2993-2998.

**Holt, KG**, Saltzman, E, Ho, CL, Ulrich, BD (2008). Scaling of dynamics in the earliest stages of walking. *Physical Therapy*.

Smith, BA, Kubo, M, Black, D, **Holt, KG**, Ulrich, DB (2007). Impact of practice on a novel task, walking on a treadmill: preadolescents with and without Down syndrome. *Physical Therapy Journal*

Barak, Y, Wagenaar, RC, **Holt, KG**. (2006). Gait characteristics of elderly people with a history of falls: A dynamic approach. *Physical Therapy*, 86, 1501-1510.

**Holt, KG**, Saltzman, E., Ho, CL, Kubo, M., Ulrich, BD. (2006). Discovery of the pendulum and spring dynamics in the early stages of walking. *Journal of Motor Behavior*, 38, 206-218.

Ho, CL, **Holt, KG**, Saltzman, E, Wagenaar, RC (2006) Functional electrical stimulation changes dynamic resources in children with spastic cerebral palsy: Dynamic modeling approach. *Physical Therapy*. 86, 987-1000.

Kubo, M., Wagenaar, RC, **Holt, KG**. Saltzman, E., (2006). Changes in axial stiffness of the trunk as a function of walking speed. *Journal of Biomechanics* 39, 750-757.

**Holt, KG** (2005). Biomechanical Models, Motor Control Theory and Development. *Infant and Child Development*. 14, 523-527.

Andres, RO, **Holt, KG**, Kubo, M. (2005) Impact of railroad ballast type on frontal plane ankle kinematics during walking. *Applied Ergonomics*, 36, 529-534.

**Holt, KG**, Wagenaar RC, Kubo, M, LaFiandra, M, & Obusek, JP. (2005). Modulation of force transmission to the head while carrying a backpack at different walking speeds. *Journal of Biomechanics*. 38, 1621-1628.

Ulrich, BD, Haehl, V, Buzzi, UG, Kubo, M, **Holt, KG**. (2004) Modeling dynamic resource utilization in populations with unique constraints: Preadolescents with and without Down syndrome. *Human Movement Science*, 22, 133-156.

Kubo, M., Wagenaar, RC, Saltzman, E., **Holt, KG**. (2004). Biomechanical mechanism for transitions in phase and frequency of arm and leg swing during walking. *Biological Cybernetics* 91, 91-98

Fonseca ST, **Holt, KG**, Saltzman, E. & Fethers, L (2004). Dynamic resources used in ambulation by children with spastic hemiplegic cerebral palsy: relationship to kinematics, energetics, and asymmetries. *Physical Therapy* 84, 344-358.

Wagenaar, RC, **Holt, KG**, Kubo, M, Ho, C-L. (2003). Gait risk factors for falls in older adults. *Journal of the American Society on Aging*. 26, 28-32.

**Holt, KG**, Wagenaar RC, Kubo, M, LaFiandra, M, & Obusek, JP (2003). Increased musculoskeletal stiffness during load carriage at increasing walking speeds maintains constant vertical excursion of the body center of mass. *Journal of Biomechanics*. 36, 465-471

LaFiandra, M. Wagenaar, RC, **Holt, KG**, & Obusek, JP. (2003) How do load carriage and walking speed influence trunk coordination and stride parameters. *Journal of Biomechanics* 36, 87-95

Chen, Y-P, Fethers, L, **Holt, KG**, & Saltzman, E. (2002). Making the mobile move: Constraining task and environment. *Infant Behavior and Development*, 25, 195-220.

LaFiandra, M. **Holt, KG**, Wagenaar, RC & Obusek, JP. (2002). Transverse plane kinematics during treadmill walking with and without load, *Clinical Biomechanics*, 17, 116-122.

Butcher, R. **Holt, KG**, Ellis, T (2001). Teaching spasticity and weakness from a dynamic systems perspective. Part 2. *Neurology Report*

**Holt, KG**, Saltzman, E, Ellis, T, & Butcher, R. (2001). Teaching spasticity and weakness from a dynamic systems perspective. Part 1. *Neurology Report* 25(3), 117-120

Fonseca ST, **Holt, KG**, Saltzman, E. & Fethers, L (2001). A dynamic model of locomotion in spastic Hemiplegic Cerebral Palsy: Influence of walking speed. *Clinical Biomechanics*. 16:9, 790-802.

**Holt, KG**, Fonseca ST, & LaFiandra, MT. (2000). The dynamics of gait in children with spastic hemiplegic cerebral palsy: theoretical and clinical implications. *Human Movement Science*, 19, 375-405.

**Holt KG**, Ratcliffe, R. & Jeng, SF (1999). Dynamic head stability in walking: Adults, children, and children with cerebral palsy. *Physical Therapy*., 79, 1153-1162.

Turvey, MT, **Holt, KG**, LaFiandra, ME, & Fonseca, ST. (1999). Can the transitions to and from running and the metabolic cost of running be determined from the kinetic energy of running. *Journal of Motor Behavior*. 31, 265-278

- Ratcliffe, R. & **Holt, KG**. (1997). Low frequency shock absorption in human walking. *Gait and Posture*. 5, 93-100.
- Holt, KG**, Butcher, R. & Fonseca ST. (1997). Limb stiffness in active movements of children with spastic hemiplegic cerebral palsy. *Pediatric Physical Therapy* 12, 50-61.
- Holt, KG**. (1996). 'Constraint' versus 'choice' in preferred movement patterns. *Brain and Behavioral Sciences*, 19, 76-77.
- Holt, KG.**, Obusek, J. & daFonseca ST. (1996). Constraints on disordered locomotion: a dynamical systems perspective on spastic cerebral palsy. *Human Movement Science.*, 15, 177-202.
- Turvey, MT, **Holt, KG**, Obusek, J, Salo, A & Kugler, PN. (1996). Adiabatic transformability hypothesis in human locomotion. *Biological Cybernetics*. 74, 107-115.
- Jeng, SF, **Holt, KG**, Fethers, L, & Certo, C. (1996). Self-optimization of walking in non-disabled children and children with spastic hemiplegic cerebral palsy. *Journal of Motor Behavior*. 28, 15-27.
- Hamill, J. Derrick, TR. & **Holt, KG**. (1995). Shock attenuation and stride frequency during running. *Human Movement Science*, 14, 45-60.
- Obusek, J. **Holt, KG**. & Rosenstein, R. (1995). Support for a hybrid mass-spring pendulum model in human leg swinging: The effects of limb stiffness on frequency. *Biological Cybernetics*, 73, 139-147.
- Holt, KG**, Jeng, SF, Ratcliffe, R, & Hamill, J. (1995). Energetic cost and stability during human walking at the preferred stride frequency. *Journal of Motor Behavior*, 27, 164-179.
- Holt, KG**. (1993). Towards general principles for research and rehabilitation of disabled populations. *Physical Therapy Practice*, 2, 1-18.
- Jeng, SF, **Holt, KG**. & Fethers, L. (1993). A new approach to movement control in children with cerebral palsy: Integration of dynamical systems and self-optimization. *Physical Therapy Practice*, 2, 19-29, 1993.
- Holt, KG**. & Jeng, SF. (1992). Advances in biomechanical analysis of the physically challenged child. *Pediatric Exercise Science*, 4, 213-235.
- Hamill, J., Bates, B., & **Holt, KG**. (1992). Timing of lower extremity joint actions during treadmill running. *Medicine and Science in Sport and Exercise*. 27, 4: 807-813.
- Hamill, J., Clarkson, P., **Holt, KG** & Freedson, P. (1991). Muscle soreness in running. *Sports Research Reviews*.
- Holt, KG.**, Hamill, J., & Andres, RO. (1991). Predicting the minimal energy costs of human walking. *Medicine and Science in Sport and Exercise*. 23, 491-498.
- Holt, KG.**, Jeng, SF, & Fethers, L.. (1990). Walking cadence of 9 year olds is predictable as the resonant frequency of a force-driven harmonic oscillator. *Pediatric Exercise Science*. 3:121-128.
- Fethers, L. & **Holt, KG**. (1990). Efficiency of human movement: Biomechanical and metabolic aspects. *Pediatric Physical Therapy*. 2:55-59.
- Holt, KG.**, Hamill, J, & Andres, RO. (1990). The force-driven harmonic oscillator as a model for human locomotion. *Human Movement Sciences*. 9:55-68.

Kelso, JAS., **Holt, KG.**, Rubin,P., & Kugler,PN. (1981). Patterns of human interlimb coordination emerge from the properties of non-linear, limit cycle oscillatory processes: Theory and data. *Journal of Motor Behavior*,13, 226-261.

Kelso, JAS., **Holt, KG.**, & Flatt, AE. (1980). The role of proprioception in the perception and control of human movement: Towards a theoretical reassessment. *Perception and Psychophysics*, 28, 45-52.

Kelso, JAS., & **Holt, KG.** (1980). Exploring a vibratory systems analysis of human movement production. *Journal of Neurophysiology*, 43, 1183-1196.

### **Book Chapters**

**Holt, KG.**, Obusek, J. & daFonseca ST. (2000) "Dynamic and thermodynamic constraints and the metabolic cost of locomotion." *Metabolic Energy Expenditure and the Learning and Control of Movement* (ed. Sparrow, W.A.), Human Kinetics Publishers.

**Holt, KG.** (1998). "Constraints in the emergence of preferred locomotory patterns" In *Timing of Behavior: Neural, Computational and Psychological Perspectives* (eds. Rosenbaum, D.A. & Collyer, C.E.), MIT Press.

**Holt, KG.**, & Hamill, J. (1995). "Running Injuries and Treatment: A Dynamic Approach." In G.J. Sammarco (Ed.) *Rehabilitation of the Foot and Ankle*. Mosby

Hamill, J., **Holt, KG.** & Derrick, T. (1995). "Running Biomechanics." In: G.J. Sanmarco (Ed.) *Rehabilitation of the Foot and Ankle*. Mosby

Kelso, JAS., **Holt, KG.**, Kugler, PN., & Turvey, MT., (1980). "On The Concept of Coordinative Structures As Dissipative Structures II: Empirical Lines Of Convergence." In: GE Stelmach and J Requin (eds.) *Tutorials in Motor Behavior* North Holland, New York. pp. 49-69.

Kelso, JAS., &**Holt, KG.** (1979) "Evidence For A Mass-Spring Model of Neuromuscular Control." (1979). In: C. Newell (ed.) *Psychology of Motor Behavior and Sport* Human Kinetics Publishers. pp. 408-417.

### **PEER-REVIEWED SCIENTIFIC PRESENTATIONS:**

Caron RR Wagenaar, RC Lewis, CL Saltzman E, **Holt KG** (2012) Vertical trajectory of center of mass is maintained with increased vertical stiffness while carrying load Proceedings American Society of Biomechanics, Annual Meeting, Gainesville, FL

Monaghan G, Lewis CL Hsu, W-H, Saltzman E, Hamill J, **Holt KG** (2012) Forefoot orientation angle determines duration and amplitude of pronation during walking, Proceedings American Society of Biomechanics, Annual Meeting, Gainesville, FL

Saltzman, E, **Holt, KG** (July, 2009). Affordances, effectivities, coordinative structures: A graph- and task-dynamic framework. Paper presented in symposium on Task Constraints on Affordance Perception (S. Lopresti-Goodman & J. Weast, [Chairs]) at the 15th International Conference on Perception and Action (ICPA-15), University of Minnesota, Minneapolis, MN.

Goldfield, E., Holt, K., & Saltzman, E. (July, 2009). Information and dynamics as foundations for assistive devices. Paper presented in symposium on Informational Guidance and Distributed Control in the Design of Assistive Devices (E. Goldfield, L. Stirling, C.-H. Yu, & A. Wolfson, [Chairs]) at the 15th International Conference on Perception and Action (ICPA-15), University of Minnesota, Minneapolis, MN. **Holt, KG.** (2006) *Learning the Dynamics of Walking: Implications for Children with Altered Dynamic Resources. Proceedings, North American Society for the Psychology of Sport and Physical Activity, Denver, Co.*

Gross D, Niu J, Zhang YQ, McLennan C, Hannan MT, Felson DT, **Holt KG**, Hunter DJ. (2005). Foot structural abnormalities and their association with hip pain. *American College of Rheumatology*

Buzzi, U, Kubo, M, Chang, CL, Ulrich, BD, & **Holt, KG** (2004). Gait Parameters and the Kinematics of Walking: Preadolescents and New Walkers, with TD and with DS. *Proceedings, North American Society for the Psychology of Sport and Physical Activity, Vancouver, BC.*

Kubo, M, Buzzi,U, **Holt, KG**, Saltzman, E, & Ulrich, BD (2004). Kinetics of Walking: Dynamic Resource Use Changes Across Development and Between Children with and Without DS. *Proceedings, North American Society for the Psychology of Sport and Physical Activity, Vancouver, BC.*

**Holt, KG**, Saltzman, E, Ho, CL, Kubo,M, Buzzi,U, Ulrich, BD (2004). Modeling: Developmental Approach Uncovers Changes in Underlying Dynamics. *Proceedings, North American Society for the Psychology of Sport and Physical Activity, Vancouver, BC.*

.LaFiandra, M, **Holt, KG**, Wagenaar, R, Obusek, J (2001) The effect of load carriage and walking speed on head stability during treadmill walking. *J. of the American College of Sports Medicine.* 33(5) ppS153.

Andres, RO, **Holt, KG**, Kubo, M. (2001) "If its not a slip, trip, or fall, what is it? Biomechanics of walking on Railroad Ballast", *Proceedings; Computer-Aided Ergonomics and Safety International Conference, Maui.*

LaFiandra, M, Obusek, J, **Holt, KG** & Wagenaar, RC (2000). The effect of load carriage on trunk coordination during treadmill walking at increasing speed. *NATO Specialists Meeting, Soldier Mobility: Innovations in Load Carriage System Design and Evaluation, Jun 2000*

Hamill, J., Derrick, TR., & **Holt, KG**. Impact shock attenuation as a function of stride frequency. *Canadian Society of Biomechanics, Biennial Meeting, Calgary, Aug 1994.*

**Holt, KG.**, Jeng, SF, Ratcliffe, R. & Hamill, J. Stability as a constraint on preferred frequency of human walking: Implications for motor control and coordination. *Proceedings XIVth International Society of Biomechanics Congress, July, 1993.* pp. 586-587.

**Holt, KG.**, Turvey, MT., Salo, A., & Obusek, J. Evidence for an adiabatic invariance in walking. *Proceedings, Seventh International Conference on Event Perception and Action.* Vancouver, B.C. August 1993. pp. 194-197.

**Holt, KG.**, & Jeng, SF. Self-optimization and dynamical systems analysis of movement disorders. *Proceedings, Seventh International Conference on Event Perception and Action.* Vancouver, B.C. August 1993. pp. 22

Hamill, J., Bates, BT., & **Holt, KG**. Timing of the knee and subtalar joint actions during treadmill running. *Proceedings, American Society of Biomechanics, Annual Meeting, Oct. 1991.*

**Holt, KG.**, Jeng,SF., Ratcliffe,R., & Hamill,J. Stability and the metabolic cost of human walking. In M. Wollacott & F. Horak (Eds.) *Posture and Gait: Control Mechanisms Vol 1.* Eugene: University of Oregon Books (pp 392-395), 1992. pp. 392-395.

Jeng,SF., **Holt, KG.**, Feters, L., & Ratcliffe, R. A preliminary study of self-optimization in normal children and children with spastic cerebral palsy during ambulation. In M. Wollacott & F. Horak (Eds.) *Posture and Gait: Control Mechanisms Vol 2.* Eugene: University of Oregon Books , 1992. pp 83-86.

**Holt, KG.**, Jeng, SF., Ratcliffe, R. & Hamill, J. Exploring the use of non-linear dynamics in the assessment of stability of human walking. *Proceedings XIII Annual International Conference of the IEEE Engineering in Medicine and Biology Society.* Orlando, FL 1991. pp 2212-2213.

**Holt, KG.**, Fethers, L., Chazan, I., Meehan, J., & Nelson, B. Affordances in gap crossing: Developmental considerations. *Society for Neuroscience Abstracts*, Vol. 16. 1990.

**Holt, KG.** The predictability of human gait: Metabolic, Biomechanical and Biophysical Considerations. Extended Abstract, *Perception and Action Workshop*, Center for the Ecological Study of Perception and Action. Univ. of Connecticut, Nov 1990.

**Holt, KG.**, Hamill, J., & Andres, RO. Resonance of the force-driven harmonic oscillator as the basis for preferred human gait: Theory and data. *Proceedings 12th Annual Conference IEEE, Engineering in Medicine and Society*, 1990.

**Holt, KG.**, Hamill, J., & Slavin, MM. Running at resonance: Is it a learned phenomenon? *Proceedings of The Canadian Society of Biomechanics*, 1990. 115-116.

Andres, RO., Clarkson, P., O'Connor, D., **Holt, KG.**, & Eng, T. Muscle damage effects on postural control. *Proceedings 12th International Congress of Biomechanics*, Los Angeles, CA, 1989.

**Holt, KG.**, Andres, RO., & Clarkson, P. Biomechanical assessment of induced muscle damage. *Proceedings 12th International Congress of Biomechanics*, Los Angeles, CA, 1989. pp 175-176.

**Holt, KG.**, Clarkson, P., Andres, RO., & Tromblay, I. Assessment of muscle damage using a non-linear mass-spring model. *Proceedings Institute of Electronic and Electrical Engineers (IEEE). Engineering in Medicine and Biology*, Boston. 1987. pp. 2012-2013.

#### **ABSTRACTS:**

Saltzman, E, Goldstein, L, **Holt, KG.** Kluzik, J, Nam, H (2007). Gait Wheels and Foot Cycles: A Parallel between the Dynamics of Locomotion and Speech. *11<sup>th</sup> International Conference on Cognitive and Neural Systems*, Boston, MA

**Holt, KG.** Learning the Dynamics of Walking: Implications for children with Altered Dynamic Resources. North American Society for the Psychology of Sport and Physical Activity, Denver, CO, June 2006

**Holt, KG,** Saltzman, E. Ho, CL, Kubo, M. Ulrich, BD (2006) Discovery of the Pendulum and Spring Dynamics in the early stages of walking. *Dynamic Walking 2006*, Ann Arbor, Michigan.

Ho, CL, **Holt, KG,** Wagenaar, RC. (2004). Functional Electrical Stimulation (FES) of Gastrocnemius-Soleus (G-S) Improves Gait Patterns by Addressing the Changed Dynamic Resources of Children with Spastic Cerebral Palsy (CP). *International Society of ElectroKinesiology (ISEK)*, Boston, MA

**Holt, KG,** Wagenaar, R., Kubo, M. & Ho, C-L. (2002). Coordination of walking in older persons at risk of falls. *The Gerontologist*, Vol 42, Special Issue I, October 2002.

Haehl, V , **Holt, KG,** Ulrich, BD (2003). Modeling the motor skill involved in an intervention strategy.. Combined Sections Meeting, American Physical Therapy Association,

Chen, Y., Fethers, L. Saltzman, E. **Holt, KG.** Effects of constraints on the emergence of kicking in young infants. Poster presented at the International Conference on Infant Studies, (ICIS 2002), Toronto, Ontario, Canada

**Holt, KG,** Wagenaar, R. LaFiandra, M., Kubo, M, Obusek, J. Changes in musculoskeletal stiffness and shock transmission during load carriage., North American Society for the Psychology of Sport and Physical Activity, Baltimore, MD, June 2002



Wagenaar, R. **Holt, KG**, LaFiandra, M. Kubo, M. Obusek, J. How do load carriage and walking speed influence trunk coordination and stride parameters? North American Society for the Psychology of Sport and Physical Activity, Baltimore, MD, June 2002

LaFiandra, M, **Holt, KG**, Kubo, M. Wagenaar, R. Transverse Plane Torque of the upper and lower body during load carriage. North American Society for the Psychology of Sport and Physical Activity, Baltimore, MD, June 2002

**Holt, KG** "What load carriage can tell us about control and coordination of walking." North American Society for the Psychology of Sport and Physical Activity, Baltimore, MD, June 2002.

Chen, Y, Fethers, L, **Holt, KG**, Saltzman, E. (2001) Effect of contingent reinforcement on the kinematics of kicking. Conference on Motor Development and Learning in Infancy. Amsterdam, The Netherlands

Chen, Y, Fethers, L, **Holt, KG**, Saltzman, E. (2001) Effect of contingent reinforcement on the kinematics of kicking. International Society for Posture and Gait, Maastricht, The Netherlands.

Kubo, M., **Holt, KG**., Wagenaar, RC., & Ho, CL. Trunk coordination during walking in the elderly at risk of falls: Effect of Speed. Combined Sections Meeting American Physical Therapy Association, San Antonio, Texas, Feb 2001.

Ho, CL., Wagenaar, RC., **Holt, KG**. & Kubo, M. Trunk coordination during walking in the elderly at risk of falls: Effect of Speed. Combined Sections Meeting American Physical Therapy Association, San Antonio, Texas, Feb 2001

**Holt, KG**, Fonseca, ST, & Butcher, R. Limb stiffness measured in active leg swinging in children with hemiplegic cerebral palsy. Combined Sections Meeting American Physical Therapy Association, Boston, Feb 1998.

**Holt, KG**, Fonseca, ST & LaFiandra, MT. Limb stiffness measured in gait of children with hemiplegic cerebral palsy. Combined Sections Meeting American Physical Therapy Association, Boston, Feb 1998.

LaFiandra, M. & **Holt, KG**. Limb stiffness and segmental phase relationships. Combined Sections Meeting American Physical Therapy Association, Boston, Feb 1998.

Kubo, M. & **Holt, KG**. Effects of upper extremity load on phase transitions in slow walking. Combined Sections Meeting American Physical Therapy Association, Boston, Feb 1998.

Fonseca, ST & **Holt, KG**. A dynamic approach to locomotion in cerebral palsy. Bernstein's Traditions in Motor Control. First International Conference, Pennsylvania State University, August 1996

Hamill, J, Derrick, TR & **Holt, KG**. Impact shock attenuation as a function of stride frequency. Joint American/Canadian Society for Biomechanics Annual Meeting, 1994.

**Holt, KG**., Jeng, SF, Ratcliffe, R. & Hamill, J. Stability as a constraint on preferred frequency of human walking: Implications for motor control and coordination. XIVth International Society of Biomechanics Congress, July, 1993.

**Holt, KG**., Turvey, MT., Salo, A. & Obusek, J. Evidences for an adiabatic invariant in walking. Seventh International Conference on Event Perception and Action. Vancouver, B.C. August 1993.

**Holt, KG**., Hamill, J., Certo, C., & Rogers, M. Tuning the novice runner to resonance. International Society for the Biomechanics of Sport, Milan, Italy, June 1992.

Hamill, J., Bates, B. **Holt, KG**., & Howard. Influence of shoe-surface interactions in rearfoot motion during running. International Society for the Biomechanics of Sport, Milan, Italy, June 1992.

Wendling, M. & **Holt, KG**. Effect of foot orthoses on running economy. American College of Sports Medicine, Annual Meeting, Dallas, Texas, May, 1992.

Jeng, S.F., **Holt, KG**., Fetters, L. & Ratcliffe, R. A preliminary study of self-optimization in normal children and children with spastic cerebral palsy during ambulation. XIth International Symposium on Posture and Gait: Control Mechanisms, May, 1992.

**Holt, KG**., Jeng, S.F., Ratcliffe, R., & Hamill, J. Stability and the metabolic cost of human walking. XIth International Symposium on Posture and Gait: Control Mechanisms, May, 1992.

**Holt, KG**., Jeng, S.F., Ratcliffe, R., & Hamill, J. Optimality Criteria in Walking. 10th Annual Meeting, International Society for Ecological Psychology, Hartford, Ct., October, 1991.

Maliszewski A-F., Freedson, P, Hamill, J. & **Holt, KG**. Muscle prestretch and running economy. American College of Sports Medicine, Orlando, Fla. May 1991.

**Holt, KG**., Slavin, MM., & Hamill, J. Running at resonance: Is it a learned phenomenon? Canadian Society of Biomechanics, Quebec City, Que. 1990

**Holt, KG**., Fetters, L., Chazan, I., Meehan, J., & Nelson, B. Affordances in gap stepping: Developmental considerations. Society for Neuroscience, 1990

**Holt, KG**., Hamill, J. & Andres, RO. Predicting the minimal energy costs of human walking: Taking advantage of resonance. American College of Sports Medicine, Salt Lake City, Utah, May, 1990.

**Holt, KG**., Manley, B., & Hamill, J. Resonance of the force-driven harmonic oscillator as the basis for preferred cadence in crutch walking: Theory and data. American College of Sports Medicine, Salt Lake City, Utah, 1990.

**Holt, KG**., Hamill, J., & Freedson, PS. Efficiency of human walking at resonance. American Physical Therapy Association, Combined Sections Meeting, New Orleans, Feb. 1990.

**Holt, KG**., Andres, RO., & Clarkson, P. Biomechanical assessment of induced muscle damage. 12th International Congress of Biomechanics, Los Angeles, Ca. 1989.

**Holt, KG**., Hamill, J., & Andres, RO. The force-driven harmonic oscillator as a model for human locomotion. American College of Sports Medicine, Baltimore, Md. 1989.

**Holt, KG**., Hamill, J., & O'Connor, D. Perceived and biomechanical effects of orthotics. New England American College of Sports Medicine, Worcester, Ma. Oct. 1988.

**Holt, KG**., Hamill, J., & O'Connor, D. Effects of orthotics in patients with rearfoot dysfunction. Canadian Society of Biomechanics. Aug. 1988.

**Holt, KG**. Assessment of muscle damage using a non-linear mass-spring model. Institute of Electronic and Electrical Engineers (IEEE). Engineering in Medicine and Biology, Boston. 1987.

**Holt, KG**., Hamill, J., Greer, N., & Andres, RO. Effect of stride length, stride frequency, and walking velocity on ground reaction forces. American College of Sports Medicine, Las Vegas, 1987.

Kelso, JAS & **Holt, KG**. Exploring a vibratory systems analysis of finger localization. International Congress of Physical Education. Trois Rivieres, Canada, 1979.

**Holt, KG**, & Christina, RW. The immediate aftereffects of overload on the senses of position and movement. North American Society for the Psychology of Sport and Physical Activity. Ithaca, New York. 1977.

**INVITED PRESENTATIONS:**

**Holt, KG** Building the Superman Suit: Lessons from Biology: The Pellecchia Memorial Lecture, University of Connecticut, Oct 2013.

**Holt, KG** Principles for Building Biologically-Inspired Exoskeletons, June 2013, University of Minas Gerais, Belo Horizonte, Brazil

**Holt, KG** The Relationship Between Foot Structure and Abnormal Lower Extremity Biomechanics, June 2013, University of Minas Gerais, Belo Horizonte, Brazil

**Holt, KG** Energy Transfer in Human Locomotion, June 2013, University of Minas Gerais, Belo Horizonte, Brazil

**Holt, KG** How we walk: Implications for the development of a soft exoskeleton for load carriage, June 2013, University of Minas Gerais, Belo Horizonte, Brazil

**Holt, KG.** Modeling Active-Passive Dynamics. Invited Presentation: Wyss Institute for Biologically Inspired Engineering, Harvard University. June 2012.

**Holt, KG.** How We Walk: Implications for the Development of a Soft Exoskeleton Invited Presentation: Wyss Institute for Biologically Inspired Engineering, Harvard University Feb 2012.

Saltzman, E. & **Holt, K.** Movement forms: A graph-dynamic perspective. Invited paper presented at the XVIII Biennial International Conference on Infant Studies as part of the pre-conference session "Realism to Relevance: An Ecological Approach to Perception, Action, and Cognition (A Festschrift to Honor the Scientific and Mentoring Contributions of Herbert L. Pick, Jr.)", Minneapolis, MN June, 2012

Saltzman, E. & **Holt, K.** A graph-dynamic perspective on movement forms. Invited paper presented at the Guy van Orden UConn Workshop on Cognition and Dynamics, VII, University of Connecticut, Storrs, CT. August, 2012

Saltzman, E, **Holt, KG** A graph-dynamic perspective on movement forms. Paper presented at the Workshop on Cognition and Dynamics, VII, University of Connecticut, Storrs CT. 2012

**Holt, KG** How do we walk: Implications for the development of orthotic and prosthetic devices. Wyss Institute, Children's Hospital, Boston June 2010

**Holt, KG** Learning to walk: Lessons for the application of FES, In NIH Grant supported Conference: Applications of Artificial Walking Technologies for FES-assisted Gait in Cerebral Palsy, Palo Alto, May 2010

**Holt, KG** Learning the dynamics of walking: A guide for intervention. Boston Action Club, Sept 2009

**Holt, KG** "Understanding the Active-Passive Dynamics of Walking: A Guide for Intervention." American Physical Therapy Association, Combined Sections Meeting, Boston, MA Feb 2007.

**Holt, KG.** "Systems Dynamics, Control and Coordination of Locomotion" University of Florida, Dec 2006.

**Holt, KG** "Learning the Dynamics of Walking: Implications for children with Altered Dynamic Resources." North American Society for the Psychology of Sport and Physical Activity, Denver, CO, June 2006.

**Holt, KG** "Discovery of Pendulum and Spring Dynamics in the Early Stages of Walking." University of Michigan, Dynamic Walking Conference, May 2006.

**Holt, KG.** "Biomechanics, Functional Anatomy and Chronic Injury" University of Connecticut, Feb 2006.

**Holt, KG.** "Dynamics and Disability" Center for the Ecological Study of Action and Perception." University of Connecticut, Nov 2005.

**Holt, KG.** "Biomechanics, Functional Anatomy and Chronic Injury" Cooley Dickinson Hospital, Northampton MA, Oct 2004.

**Holt, KG.** "A systems approach to understanding movement and rehabilitation." Boston University, Sept 2004

**Holt, KG** "The Role of Biomechanics in Determining the Coordination Patterns in Walking". Invited Address, II Brazilian Congress of Motor Behavior – New Horizons in Motor Behavior, Federal University of Minas Gerais State (UFMG), Belo Horizonte, Brasil, Sept 2004.

**Holt, KG.** "Modeling Dynamic Resources During Walking" International Society of Electrophysiological Kinesiology, Boston, June 2004.

**Holt, KG** "Understanding Injury and Disablement through Dynamic Models of Locomotion". Keynote Address, X Congresso Brasileiro de Biomecanica, Ouro Preto, Brasil, June 2003.

**Holt, KG** "Cerebral Palsy Gait Modeling" X Congresso Brasileiro de Biomecanica, Ouro Preto, Brasil, June 2003.

**Holt, KG** "Structural abnormalities and chronic musculoskeletal injury" X Congresso Brasileiro de Biomecanica, Ouro Preto, Brasil, June 2003.

**Holt, KG** "Understanding Injury and Disablement through Dynamic Models of Locomotion". University, Federal de Minas Gerais, Belo Horizonte, Brasil, June 2003.

**Holt, KG** "Structural Abnormalities and the Mechanical causes of musculoskeletal Injury" Boston University Medical School, Spring 2003.

**Holt, KG** "Understanding Disablement through Dynamic Models of Locomotion " New York University, Fall, 2001.

**Holt, KG** "Understanding Disablement through Dynamic Models of Locomotion: Implications for Rehabilitation. " Boston University, Interdisciplinary Research Seminar, Fall 2001.

**Holt, KG** Teaching Spasticity and weakness from a dynamic systems perspective. Combined Sections Meeting, San Antonio, Tx 2001

**Holt, KG.** "The Meaning of Life, and Other Opinions" Reflections with Faculty Series, Boston University, Spring 2000.

**Holt, KG.** " Hemiplegic Cerebral Palsy Gait: The Pendulum and the Pogo Stick." University of Michigan, Ann Arbor, MI, 1999.

**Holt, KG.** " Hemiplegic Cerebral Palsy Gait: The Pendulum and the Pogo Stick." Husson College, Bangor, Maine, 1998.

**Holt, KG.** "The Role of Dynamics in Disability." Annual Conference, North American Society for the Psychology of Sport and Physical Activity, Chicago, 1998.

**Holt, KG.** "The Role of Muscle Contractions in Walking." University of Massachusetts, 1998.

**Holt, KG.** "The Newtonian underpinnings of relative phase in typical and atypical gaits." 9th International Conference on Event Perception and Action, Toronto, Canada, Summer, 1997.

**Holt, KG**, "The dynamics of gait in cerebral palsy" American College of Sports Medicine, New England Chapter, November, 1996.

**Holt, KG**. Fonseca. S. and Obusek, J. "The dynamics of normal and disordered walking gait." North American Meeting of the International Society for Ecological Psychology. University of Massachusetts, Amherst, March, 1997).

**Holt, KG**, "Foot Structure, Foot Motion and Causes of Injury" Faulkner Hospital, October, 1996.

**Holt, KG**. 'Dynamics of normal and disordered locomotion.' Bernstein's Traditions in Motor Control. First International Conference, Pennsylvania State University, August 1996

**Holt, KG**. Keynote Address 'Constraints and the Emergence of Locomotor Patterns.' North American Society for the Psychology of Sport and Physical Activity (NASPSPA), Minnett, Canada, June, 1996.

**Holt, KG**. The mechanical and muscular sources of metabolic cost for walking. New England Chapter, American College of Sports Medicine, Annual Meeting, November, 1995.

**Holt, KG**. Dynamic adaptation versus neurological deficit in disordered locomotion, Biomedical Engineering Society, Annual Conference, Oct 1995.

**Holt, KG**. Head stability in walking: Dynamical System approaches. 3rd International Head and Neck Symposium, Vail, CO, July 1995

**Holt, KG**. How to organize an Ergonomics Team Approach. 2nd Annual Northeast Ergonomics Conference. May 1995.

**Holt, KG**. Why we locomote the way we do: Metabolic, Mechanical and Dynamical Constraints on Walking and Running. Brown University, Dept. of Cognitive Psychology and Linguistics. Mar. 1995.

**Holt, KG**. Structural Abnormalities, Foot Motion, and Injuries. Cooley Dickinson Hospital, Medical Staff Lectures, Northampton, Ma. Feb. 1995

**Holt, KG**. Two presentations; "Physical Fatigue. " "Exercise and Wellness Programs " Northwest Center for Occupational Health and Safety Workshop. University of Washington. Introduction to Ergonomics, Jan. 1995

**Holt, KG**. Why we locomote the way we do: Metabolic, Mechanical and Dynamical Constraints on Walking and Running. New England Chapter, American College of Sports Medicine, Annual Sports Medicine Meeting, November, 1994

**Holt, KG**. Constraints on Human Locomotion. Neuromuscular Research Center, Boston University, February, 1994.

**Holt, KG**. Structural Abnormalities, Foot Motion, and Injuries. New England Chapter, American College of Sports Medicine, Annual Sports Medicine Meeting, November, 1993.

**Holt, KG**. Self-optimization and dynamical systems analysis of movement disorders. Lahey Clinic Evening Lecture Series, September, 1993.

**Holt, KG**. The dynamic systems approach to motor control and coordination: Recent advances. Brandeis University, Graybiel Laboratories, September, 1993.

**Holt, KG**. & S.F. Jeng Self-optimization and dynamical systems analysis of movement disorders. 7th International Conference on Event Perception and Action, Vancouver, B.C. August, 1993.

**Holt, KG.** Optimality Criteria in Human Walking. 40th Annual Meeting, American College of Sports Medicine. Seattle, Washington, June, 1993.

**Holt, KG.** Injuries and injury prevention in STEP aerobics: Why step height and step rate are so important. International Dance Educators Association. Annual Meeting. New Orleans, July, 1993.

**Holt, KG.** Risk Factors and Solutions in the workplace. Columbia House Records and Tapes. Several lectures given to work force. 1992-1993.

**Holt, KG.** The dynamical systems and self-optimization approaches to motor control: Implications for Physical Therapy, Massachusetts Chapter, American Physical Therapy Association, Eastern District Fall Meeting, 1992

**Holt, KG.** Self-optimization as constraint on preferred human movement. Department of Cognitive and Neural Science. Massachusetts Institute of Technology. Boston, Ma. Sept. 1992.

**Holt, KG.,** Jeng, S.F., Ratcliffe, R., & Hamill, J. Exploring the Use of Non-Linear Dynamics in the Assessment of Stability of Human Walking. 13th Annual Conference IEEE, Engineering in Medicine and Biology Society. Orlando, Fla. Nov 1991.

**Holt, KG.** Biomechanics of Running Injuries. "Gait: Strategies for Physical Therapy Intervention". Educational Resources. Framingham, Ma. September 1991.

**Holt, KG.** Predictability of Cadence, Metabolic Cost and Mechanical Energy Conservation in Experienced and Inexperienced Crutch Walkers. American Association of Health Physical Education and Recreation, Kinesiology Academy, Annual Conference. San Francisco, Ca. April, 1991

**Holt, KG.** The predictability of human gait: Metabolic, Biomechanical and Biophysical Considerations. Perception and Action Workshop, Center for the Ecological Study of Perception and Action. Univ. of Connecticut, Nov 1990

**Holt, KG.,** Hamill, J., & Andres, RO. Resonance of the force-driven harmonic oscillator as the basis for preferred cadence in human gait. 12th Annual Conference IEEE, Engineering in Medicine and Biology Society. Philadelphia, Pa. 1990

**Holt, KG.** Efficiency of human locomotion: Biomechanical, biophysical and metabolic considerations. Neuromuscular Research Center, Boston University, Feb. 1990.

**Holt, KG.** Consideration of back function and dysfunction in the ergonomics of chair design. University of Massachusetts, Department of Environmental Health and Safety, January, April, 1986.

**Holt, KG.** Rehabilitation of selected foot, ankle and knee injuries. Northeastern Athletic Injury Conference, West Springfield, Ma. 1985.

**Holt, KG.** Biomechanical evaluation for orthotics. University of Massachusetts, University Health Services, 1985.

**Holt, KG.** Evaluation and treatment of low back pain. University of Massachusetts, University Health Services, 1985.

**Holt, KG.** Sacro-Iliac joint dysfunction. University of Massachusetts, University Health Services, 1985.

**Holt, KG.** An overview of motor control theory and the development of appropriate models for physical therapy. Boston University, 1982

**POPULAR PRESS**

*Australopithecus sediba*

Science magazine podcast on *Australopithecus sediba* fossils:

<http://www.sciencemag.org/content/340/6129/1232999/suppl/DC2>

Research on *Australopithecus sediba* featured in BU Today, Bostonia, and in BU Annual Report

<http://www.bu.edu/anthrop/2013/09/23/walking-like-a-cavewoman/>

<http://www.bu.edu/ar/2013/desilva/>

Research on *Australopithecus sediba* featured in Boston University College of Arts & Sciences Magazine, and Inside Sargent

<http://www.bu.edu/cas/magazine/fall13/desilva/>

[http://www.bu.edu/sargent/files/2009/09/SAR\\_InsideSargent\\_Fall2013\\_Final.pdf](http://www.bu.edu/sargent/files/2009/09/SAR_InsideSargent_Fall2013_Final.pdf)

Research on walking in *Australopithecus sediba* appeared in the *Economist*, *New Scientist*, *Nature*, CNN, BBC, NPR, and various news agencies that carried the Associated Press story. Boston Globe story:

<http://www.bostonglobe.com/news/science/2013/04/11/early-human-ancestor-had-distinctive-gait-fossil-study-suggests/NWW1Vs1BqXmrOmBdGGM6VK/story.html>

**FUNDED/IN REVIEW GRANT ACIVITY:**

DARPA Warrior Web. PI on subcontract (Conor Walsh PI) Smart Exoskeleton Suit: Biomedically Synergistic Body Support and Protection System Task B Phase 1 Feb 2014 – Feb 2016  
\$9,500,000

DARPA Warrior Web. PI on subcontract (Conor Walsh PI) Smart Exoskeleton Suit: Biomedically Synergistic Body Support and Protection System Phase 2A/B 11-72 July 2013-January 2015 funded

US Army RDECOM White Paper PI. Tensegrity-like Exoskeleton for Modulating Joint Stiffness. BAA-11-13-2. Not funded.

NSF PI on subcontract (Gene Goldfield, PI) CPS: Synergy: Collaborative Research: Cyberphysical Synthetic Integrated Soft Tissue Envelope Modules (Sistems) that Learn From Body Motion To Assist Walking. Not funded.

DARPA Warrior Web. PI on subcontract (Conor Walsh PI) Smart Exoskeleton Suit: Biomedically Synergistic Body Support and Protection System Task A Phase 1 11-72-WW-FP-019 July 2012-July 2013.\$1,125,000 funded.

National Institutes of Health. Investigator. (Jessica Rose, PI) Applications of Artificial Walking Technologies for FES-assisted Gait in Cerebral Palsy 1R13HD062146-01 September 21, 2010 (Travel Funds)

National Science Foundation, PI on subcontract. (Goldfield, E. PI) Programmable second skin for re-educating injured nervous systems. 2009-2013. \$450,000.

National Institutes of Health. PI 2008-2113. Dynamic Resources Modeling Approach as a Guide to FES Intervention in Children with CP. \$2.5M. not funded

Center for the Integration of Medicine and Innovative Technology (CIMIT). (2008) Inertial Sensing of Stiffness Modulation for Control of Robotic Assistive Devices in Infants at Risk of Cerebral Palsy. \$100,000. Not funded.

National Institute for Disability, Rehabilitation Research. Co-PI (with David Hunter, PI, Boston Medical Center). 2004-2008. A Randomized Trial of Realignment Therapy for Treatment of Medial Knee Osteoarthritis. \$450,000. Funded.

Boston University Aging Research Center. Pilot Project Grant, co-PI (with David Hunter). Foot Mechanical Disorders and their association with hip and low back pain. \$20000. Funded. 2003-2004

National Science Foundation, P.I. on subcontract, Mechanical Model of Dynamic Resources used to Optimize Gait, \$771,865.00. Not funded.

National Institutes of Health. P.I. on subcontract, University of Michigan (PI - Dr. Beverly Ulrich), "Modeling Dynamic Resources to Solve Movement Problems." (2002-2006) \$930,000. Funded.

United States Army, Principal Investigator " Models of Human Locomotion: Implications for Load Carriage." 2000-2002. 20% salary per 12 month appointment. Funded.

National Institutes of Health.Co-Investigator (PI - Dr. Robert Wagenaar), "Efficacy of Physical Therapy in Parkinson's Disease." \$746,000, 3 yr. grant 2000-2003. Not funded.

National Institute of Aging, Roybal Center. co-Principal Investigator (with Dr. Robert Wagenaar), "Predicting Falls in the Elderly" \$10,000. 1 yr grant 1999-2000. Funded.

National Institute of Disability and Rehabilitation Research. Principal Investigator, "Efficacy of Functional Electrical Stimulation of Children with Spastic Hemiplegic Cerebral Palsy. \$445,000, 3 yr grant, 2000-2003. Not Funded.

United Cerebral Palsy Principal Investigator, "Efficacy of Functional Electrical Stimulation of Children with Spastic Hemiplegic Cerebral Palsy. \$100,000, 2 yr grant, 2000-2002. Funded.

Foundation for Physical Therapy. Principal Investigator. "A Dynamic Functional Measure of Spasticity In Cerebral Palsy." \$100,000, 1995-1997 (extended to 1998). Funded

Boston University, Sargent Accelerated Research Award. Principal Investigator. "Self-Optimization and Dynamical Systems Approaches to Understanding Movement Dysfunction". \$17,000, 1 yr grant. 1993-1994. Funded

U.S. Department of Education, Education of Individuals with Disabilities Program. Principal Investigator. "Investigations Of Criteria To Improve The Teaching Of Walking To Children With Cerebral Palsy." \$75,000. 1992-1993. Funded

United States Army. Design and testing of footwear for the Army. Co-Investigator to contract awarded to Dr. Joseph Hamill, University of Massachusetts. \$180,000, 2 yr grant. 1992. Funded

Boston University. Biomedical Research Support Grant. Principal Investigator. Awarded for research on "Teaching Minimization Of Metabolic Costs: Application To Patient Populations." \$3,000, 1 yr grant. 1990. Funded



Foundation for Physical Therapy. Doctoral Research Support Grant. \$4,600, 1 yr grant. 1987-1988. Funded.

University of Massachusetts. Biomedical Research Support Grant. Co-investigator. Awarded for research on the biomechanical effects of orthoses. \$5,000 1 yr grant, 1986. Funded

### **OTHER SCHOLARLY PRODUCTS:**

#### **Book Reviews**

Key, G., *Definitive Industrial Therapy* Mosby Year Book, 1992.

Gould, JA. *Orthopedic and Sports Physical Therapy*, Mosby Year Book, 1992.

Rosenbaum, D.A. & Collyer, C.E. eds. *Timing of Behavior: Neural, Computational and Psychological Perspectives* eds. MIT Press) 1998.

#### **Grant Review**

National Institute on Disability and Rehabilitation Research	1991
LifeFitness Research Awards	1994

#### **Editorial Board/Manuscript Review - Scientific Journals (ongoing)**

Brazilian Journal of Physical Therapy (editorial board)	2004-
European Journal of Applied Physiology	2004-
Journal of Biomechanics	2002-
Canadian Journal of Zoology	2001-
Journal of Experimental Psychology: Human Perception and Performance	1996-
Journal of Motor Behavior	1995-
Journal of Orthopedic and Sports Physical Therapy	1991-
Medicine and Science in Sports and Exercise	1991-
Medicine, Exercise, Nutrition and Health	1992-
Ecological Psychology	1992-
Transactions, Institute of Electronic and Electrical Engineers	1994-

#### **Conference Abstract Review**

Abstract Reviewer, American College of Sports Medicine	1991
Ad hoc Reviewer, American Association of Health, Physical Education Recreation and Dance	1991

#### **Scientific Advisory/Review Board**

Rockport Walking Institute	1990-1991
STEP Aerobics Institute	1993
LifeFitness	1994

### **RESEARCH ACTIVITY:**

#### **Manuscripts In Preparation (Full Scientific)**

### **CONTINUING EDUCATION WORKSHOPS CONDUCTED/ORGANIZED:**

#### **Symposia**

"What load carriage can tell us about control and coordination of walking." Presented at Annual Conference, North American Society for the Psychology of Sport and Physical Activity, Baltimore, MD, June 2002.

"A Systems Approach to Teaching Effective Ways to Examine and Treat Spasticity and Weakness." Presented at Education Forum: Teaching Examination and Treatment of Spasticity and Weakness APTA Combined sections Meeting, San Antonio, Texas, 2001

"Dynamics of Movement Disorders: Implications for Evaluation and Treatment." Presented at APTA Annual National Conference, Washington, DC, June 1999.

"Dynamics of Movement Disorders." Presented at Annual Conference, North American Society for the Psychology of Sport and Physical Activity, Clearwater Beach, FL., June 1999.

### **Workshops**

Ergonomics for the Health Care Professional, Associated Rehabilitation Services, May, 1994

Ergonomic Job Analysis for the Health Care Professional, Ergonomic Engineering Inc., Jan 1995

### **MEMBERSHIPS IN PROFESSIONAL ORGANIZATIONS (PAST AND PRESENT):**

American Physical Therapy Association  
 American College of Sports Medicine  
 Canadian Society of Biomechanics  
 International Society for Ecological Psychology  
 International Society of Biomechanics  
 North American Society for Psychology of Sport and Physical Activity

### **CONSULTATIVE AND ADVISORY POSITIONS:**

Sept 91-Present Ergonomic Engineering Inc. P.T./Research Consultant  
 Consultant to industry. Presentations to factory workers on hazards, injury prevention, self-diagnosis, and treatment. Devised and implemented exercise programs for prevention of cumulative trauma disorders to be performed in the workplace. Devised and implemented medical management program to meet OSHA guidelines. Medical consultant for interpretation of exercise machine safety.

1992 - present Biomotion Consulting (self) Expert Witness  
 Biomechanics/physical therapy consultation and expert witness in accident and work injury litigation. Specializing in biomechanical analysis and the relationship to injuries. Cases have included biomechanics and injury as related to sports participation, exercise machine safety, motor vehicle accidents, footwear design and manufacture.

March 1993 STEP Aerobics Research Consultant  
 Development of theoretical basis for optimal step frequency and step height for the prevention of injuries. Presentation to the International Dance Educators Association.

1992 Trotter Treadmills Research Consultant  
 Funding and Equipment Supply for study on "Comparison of the effects of treadmill walking and stair climbing on metabolic mechanical and muscle activity."

1992 Dept. Public Health. P.T. Consultant  
 Steering Committee on the use of computerized postural screening devices for elementary schools.

1991 Shoe Industry PT/Research Consultant  
 (LA Gear, New Balance)  
 Running shoe testing and design. Evaluation of postural problems that could lead to injury.

Summer1991 - 1992 United States Army. P.T. Consultant  
 Design and testing of footwear for the Army. Consultant to grant awarded to Dr. Joseph Hamill, University of Massachusetts.

### **COMMITTEES AND SERVICE:**

#### **University**

University Grievance Committee	2006 - 2007
Faculty Advisor to Allied Health Professions	1993 - 2005
University Scholarships and Fellowships Committee	2001 - 2002
Faculty-in-Residence, Shelton Hall/Warren Towers	1990 - 1995
Quality of Life Committee, Shelton Hall	1990 - 1995
Residence Hall Association, Shelton Hall	1990 - 1995
Office of Planned Giving	1992

#### **College**

Human Subjects Review Committee	2004 - present
Acting Director, Sargent College ScD Programs	2002 - 2003
Chairman, Promotion and Tenure Committee	2001 - 2003
Faculty Council	2001 - 2003
Promotion and Tenure Committee	1995 - 2003
Development of proposal for International Exchange Program	1996
Development of proposal for Center for Rehabilitation Research	1996
Institutional Review Board	1994 - 1996
Graduate Education Committee	1992 - 1996
Dudley Allen Sargent Grant Review Committee	1994
Ergonomics Education Development Program	1994
Computer Network Development Task Force	1993
Academic Policy and Procedures Committee	1989 - 1993

#### **Department**

Committee on Academic Policy and Procedures	1999 - present
Doctoral Program Development Committee	1989 - present
Director, Advanced Graduate Program (Movement and Rehabilitation Science)	2000 - 2003
Advanced DPT Committee	2000 - 2001
Curriculum Committee	1999 - 2000
Chair, Chairman Evaluation Committee	2000
Curriculum Development Committee -neurology, orthopedics	1991 - 1998
Curriculum Development Committee - orthopedics	1991 - 1998
Chair, Search Committee	1991 - 1998
Coordinator, Computer Network Development	1992 - 1996
Advanced Masters Committee	1989 - 1996
Chair, Faculty Retreat	1989 - 1994
Search Committee	1989 - 1991

### **HONORS and AWARDS:**

Whitney Powers Teaching Excellence Award, 2013  
 Lifetime Associate, Brain and Behavioral Sciences, 1995  
 American Physical Therapy Association, Massachusetts Chapter. Research Award, 1995.  
 Honorary Member, Golden Key National Honor Society  
 Lifetime Fellow, Center for the Ecological Study of Perception and Action, University of Connecticut, 1992.  
 Rockport Walking Institute. Elected to the Scientific Advisory Board, 1990.  
 Journal of Orthopedic and Sports Physical Therapy. Manuscript Review Board, 1991 -

Engineering Foundation (IEEE). Award to attend conference of scholars, "Biomechanics and the Neural Control of Movement". New England College, Henniker, New Hampshire. July, 1987.  
 Rehabilitation Services Association. Award based on academic excellence and potential in the field of physical therapy. 1982.  
 Boston University. Sargent College of Allied Health Professions. Award based on academic excellence, potential in the field of physical therapy. 1982.

### **COURSES TAUGHT**

Advanced Human Movement  
 Evaluation of Gait Disorders  
 Scientific Basis of Human Movement  
 Advanced Kinesiology and Biomechanics  
 Advanced Biomechanics  
 Functional Anatomy  
 Educational Theory and Practice  
 Teaching Skills  
 Clinical Medicine  
 Critical Analysis of Orthopedic Techniques  
 Critical Analysis of Sports and Orthopedic Techniques  
 Musculoskeletal Evaluation  
 Case Conference III: Scientific Basis of Case Management  
 Research Seminar (multiple topics)  
 Directed Research in Allied Health Professions (multiple topics)

### **GRADUATED DOCTORAL STUDENTS**

Wen Hao Hsu: Post-doctoral student Wyss Institute for Biologically Inspired Engineering, Harvard University  
 Gail Monaghan: Advanced Clinician, Spaulding Rehabilitation Hospital  
 Robert Caron: Assistant Professor, Assumption College  
 Lee Marinko: Clinical Associate Professor, Dept. Physical Therapy and Athletic Training, Boston University  
 Douglas Gross: Associate Professor, MGH Institute of Health Professions  
 Chia Ling Ho: Mother  
 Sharon Sharpe: Owner, Achieve Therapeutics, Natick, MA  
 Masayoshi Kubo: Professor, Niigata University, Japan  
 Mike LaFiandra: Branch Chief, Dismounted Warrior Branch at Human Research & Engineering Directorate, Army Research Laboratories  
 Sergio Fonseca: Professor, Dean of Research, University of Minas Gerais, Brazil  
 Jack Obusek: Director, U.S. Army Natick Soldier Research, Development and Engineering Center (Retired)  
 Suh Fang Jeng: Professor, Director School and Graduate Institute of Physical Therapy, National Taiwan University