

## Curriculum Vitae – John Randall Flanagan

### Contact Information

Professor of Psychology and Physiology  
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### Education

Ph.D. McGill University, Psychology 1992  
M.A. McGill University, Physical Education 1986  
B.P.E. University of Alberta, Physical Education 1983

### Positions

Professor, Departments of Psychology and Physiology, Queen's University, July 2006.

Visiting Professor, Department of Integrative Medical Biology, Umeå University, Appointed July 2001.

Associate Professor, Departments of Psychology and Physiology, Queen's University, Promoted July 2000.

Assistant Professor, Department of Physiology, Queen's University, Appointed July 1998.

Assistant Professor, Department of Psychology, Queen's University, Appointed January 1995.

Assistant Professor, Department of Movement Sciences and Education, Teachers College, Columbia University, Appointed January 1994.

### Fellowships and Visitorships

Senior Visiting Scientist, Institute of Neurology, University College London, December 2000 to May 2001.

NSERC Postdoctoral Fellow, MRC Applied Psychology Unit, Cambridge, UK and Department of Anatomy, University of Cambridge, Jan 1992 to Jan 1994.

### Funding

#### Current Funding

Canadian Institutes of Health Research Operating Grant: "Sensorimotor control processes underlying object manipulation tasks". Flanagan (PI). \$711,015: 2012-2017.

Ontario Research Fund for Excellence Funding Round 4: "Quantifying sensorimotor function and dysfunction". Scott (PI), Black, Blohm, Flanagan, Glasgow, McIlroy, Munoz. \$2,900,000: 2010-2015.

Canadian Foundation for Innovation and Ontario Innovation Trust, Leading Edge Fund: "Development of new assessment tools for evaluation of brain function and dysfunction". Munoz (Lead), Flanagan, Glasgow, Johansson, Johnsrude, Munhall, Scott, Stroman, Theeuwes, Wolpert (co-PIs). \$14,000,000: 2007-2012.

Natural Sciences and Engineering Research Council of Canada Operating Grant: "Representing object weight in action and perception". Flanagan (PI). \$225,000: 2009-2014.

Natural Sciences and Engineering Research Council of Canada Equipment Grant: “Robotic device for studies of human movement control”. Flanagan (PI). \$140,353: 2011-12.

### Previous Funding

Canadian Institutes of Health Research Operating Grant: “Sensorimotor control processes underlying object manipulation”. Flanagan (PI). \$554,400: 2007-2012.

Canadian Institutes of Health Research Resource Grant: “Peripheral equipment and maintenance of facility for functional magnetic resonance imaging in humans and non-human primates”. Munoz, Stroman (PIs). \$428,052: 2006-2011.

Canadian Institutes of Health Research Group Grant: “Sensory motor integration: from reflexes to social interactions”. Dorris, Flanagan, Munoz, Paré, Rose, Scott (co-PIs). \$1,891,750: 2005-2010.

Natural Sciences and Engineering Research Council of Canada Operating Grant: “Prediction and control in motor learning and performance”. Flanagan (PI). \$150,000: 2004-2009.

Human Frontier Science Program Research Grant: “Controlling the statistics of action: noise and uncertainty in sensorimotor control”. Flanagan (PI), Kitazawa, Shadmehr, Wolpert. US \$1,350,000: 2003-2006.

Canadian Institutes of Health Research Operating Grant: “Eye-hand coordination in motor control and motor learning”. Flanagan (PI). \$208,938: 2003-2006.

Canadian Institutes of Health Research Group Grant: “Sensory-motor systems: studies in behaviour, dysfunction, and plasticity”. Flanagan, Kawaja, Munoz, Rose, Ross, Scott (co-PIs). \$2,098,902: 2001-2005.

Canadian Foundation for Innovation and Ontario Innovation Trust: “Parallel laboratories for Studies of eye-hand coordination in humans and non-human primates”. Flanagan (PI), Munoz, Paré, Scott. \$1,110,915: 2000-2005.

Natural Sciences and Engineering Research Council of Canada Operating Grant: “Internal models of sensorimotor transformations underlying interactions with the environment”. Flanagan (PI). \$136,500: 1999-2004.

Canadian Institutes of Health Research (CIHR) Operating Grant: “Visual guidance of hand movement in object manipulation”. Flanagan (PI), Munoz, Paré. \$215,162: 2000-2003.

Human Frontier Science Program (HFSP): “Internal models for multiple tasks in sensorimotor control”. Wolpert (PI), Flanagan, Kalaska, Kawato, Kitazawa, Lemon. US \$750,000: 1999-2002.

Natural Sciences and Engineering Research Council of Canada Major Equipment Grant: “Artificial mechanical environment for studies of human motor control”. Ostry (PI), Flanagan, Levin, Munhall, Ramsay, Terzopoulos. \$200,000: 1999.

Tourette Syndrome Association (USA): “Eye and hand coordination in Tourette syndrome.” Flanagan, Munoz (co-PIs). \$56,000: 1999.

Natural Sciences and Engineering Research Council of Canada Equipment Grant: “Internal models of sensorimotor transformations underlying interactions with the environment”. Flanagan (PI). \$10,000: 1999.

Queen's University Advisory Research Council Grant: “Sensorimotor control of multiple digit manipulation.” Flanagan (PI). \$5,000: 1996.

Natural Sciences and Engineering Research Council of Canada Operating Grant: “The organization of internal representations underlying motion planning and control.” Flanagan (PI). \$79,950: 1995-1999.

Queen's University Advisory Research Council Grant: "Adaptation in altered visuomotor environments." Flanagan (PI). \$6,500: 1995.

Natural Sciences and Engineering Research Council of Canada Equipment Grant: "The organization of internal representations underlying motion planning and control." Flanagan (PI). \$41,445: 1995.

National Science Foundation (USA): "Acquisition of a system of instruments for the measurement and analysis of human multi-joint movement control." Flanagan (PI), Gentile, Ghez, Weir. \$247,800: 1995.

## Professional Contributions

### Editorial Boards

Experimental Brain Research, 2000-

Member of the Faculty of 1000 Biology, 2006-

### Ad Hoc Journal Reviewing

Behavioural Brain Research, Brain, Brain Research, Canadian Journal of Physiology and Pharmacology, Cerebral Cortex, Current Biology, Ergonomics, European Journal of Neuroscience, Experimental Brain Research, IEEE Transactions on Robotics and Automation, Journal of Motor Behavior, Journal of Experimental Psychology: Human Perception and Performance, Journal of Physiology (London), Journal of Neurophysiology, Journal of Neuroscience, Journal of Vision, Nature, Nature Neuroscience, Nature Reviews Neuroscience, Perception, Perception & Psychophysics, Psychological Science, Psychonomic Bulletin & Review, PLoS: Biology, Science, Spatial Vision, Quarterly Journal of Experimental Psychology

### Ad Hoc Grant Reviewing

Alberta Heritage Foundation, Canadian Foundation for Innovation, Canadian Institutes of Health Research, Canadian Natural Sciences and Engineering Research Council, Human Frontiers Science Program, National Science Foundation (USA), Wellcome Trust (UK)

### Grant Committees

Canadian Institutes of Health Research (CIHR) Movement & Exercise, 2006

Canadian Institutes of Health Research (CIHR) Behavioural Sciences C, 2005, 2007-

National Institutes of Health (NIH) Study Section IFCN5 (Integrative, Functional and Cognitive Neuroscience), 2002

### Professional Societies

Society for Neuroscience

Society for the Neural Control of Movement

## Refereed Journal Publications

Danion F, Diamond JS, FLANAGAN JR (2012) The role of haptic feedback when manipulating non-rigid objects. **Journal of Neurophysiology** 107: 433-441

Wolpert DM, Diedrichsen J, FLANAGAN JR (2011) Principles of sensorimotor learning. **Nature Reviews Neuroscience** 12: 739-51

Ingram JN, Howard IS, FLANAGAN JR, Wolpert DM (2011) A single-rate context-dependent learning process underlies rapid adaptation to familiar object dynamics. **PLoS Computational Biology** 7(9): e1002196

- [70] Fernández-Ruiz J, Wong W, Armstrong IT, FLANAGAN JR. (2011) Relation between reaction time and reach errors during visuomotor adaptation. **Behavioural Brain Research** 219: 8-14
- Ingram JN, Howard IS, FLANAGAN JR, Wolpert DM (2010) Multiple grasp-specific representations of tool dynamics mediate skilful manipulation. **Current Biology** 20: 618-623
- Pruszynski JA, King GL, Boisse L, Scott SH, FLANAGAN JR, Munoz DP (2010) Visual responses on human arm muscles reveal a rapid neural pathway linking visual input to arm motor output. **European Journal of Neuroscience** 32: 1049-1057
- Sabbagh MA, Hopkins SFR, Benson JE, FLANAGAN JR (2010) Conceptual change and preschoolers' theory of mind: evidence from load-force adaptation. **Neural Networks** 23: 1043-1050
- Wolpert DM, FLANAGAN JR (2010) Q&A: Robotics as a tool for understanding the brain. **BMC Biology** 8:92
- [65] Wolpert DM, FLANAGAN JR (2010) Motor learning. **Current Biology** 20: R467-R472
- Bowman MC, Johansson RS, FLANAGAN JR (2009) Eye-hand coordination in a sequential object manipulation task. **Experimental Brain Research** 195: 273-83
- Johansson RS, FLANAGAN JR (2009) Coding and use of tactile signals from the fingertips in object manipulation. **Nature Reviews Neuroscience** 10: 345-359
- Ahmed AA, Wolpert DM, FLANAGAN JR (2008) Flexible representations of dynamics are used in object manipulation. **Current Biology** 18: 763-768
- Bursztyn LLCD, FLANAGAN JR (2008) Sensorimotor memory for weight asymmetry in object manipulation. **Experimental Brain Research** 184: 127-133
- [60] Chang EC, FLANAGAN JR, Goodale MA (2008) The intermanual transfer of anticipatory force control in precision grip lifting is not influenced by the perception of weight. **Experimental Brain Research** 185: 319-329
- FLANAGAN JR, Bittner JP, Johansson RS. (2008) Experience can change distinct size-weight priors engaged when lifting objects and judging their weights. **Current Biology** 18: 1742-1747
- FLANAGAN JR, Terao Y, Johansson RS (2008) Gaze behavior when reaching to remembered targets. **Journal of Neurophysiology** 100: 1533-1543
- Hamilton AF, Joyce DW, FLANAGAN JR, Frith CD, Wolpert DM (2007) Kinematic cues in perceptual weight judgment and their origins in box lifting. **Psychological Research** 71: 13-21
- Bays PM, FLANAGAN JR, Wolpert DM (2006) Attenuation of self-generated tactile sensations is predictive not postdictive. **Public Library of Science: Biology** 4(2): e28
- [55] Bursztyn LLCD, Ganesh G, Imamizu H, Kawato M, FLANAGAN JR (2006) Neural correlates of internal model loading. **Current Biology** 16: 2440-2445
- FLANAGAN JR, Bowman MC, Johansson RS (2006) Control strategies in object manipulation tasks. **Current Opinion in Neurobiology** 16: 650-659
- Rotman G, Troje NF, Johansson RS, FLANAGAN JR (2006) Eye movements when observing predictable and unpredictable actions. **Journal of Neurophysiology** 96: 1358-1369
- Bays PM, FLANAGAN JR, Wolpert DM (2005) Interference between velocity- and position-dependent force-fields indicates that tasks depending on different kinematic parameters complete for motor working memory. **Experimental Brain Research** 163: 400-405

- Bays PM, Wolpert DM, FLANAGAN JR (2005) Perception of the consequences of self-action is temporally tuned and event-driven. **Current Biology** 15: 1125-1128
- [50] Davidson PR, Wolpert DM, Scott SH, FLANAGAN JR (2005) Common encoding of novel dynamic loads applied to the hand and arm. **Journal of Neuroscience** 25: 5425-5429
- Klassen J, Tong C, FLANAGAN JR (2005) Learning and recall of incremental kinematic and dynamic sensorimotor transformations. **Experimental Brain Research** 164: 250-259
- Sailer U, FLANAGAN JR, Johansson RS (2005) Eye-hand coordination during learning of a novel visuomotor task. **Journal of Neuroscience** 25: 8833-8842
- Caithness G, Osu R, Bays P, Chase H, Klassen J, Kawato M, Wolpert DM, FLANAGAN JR (2004) Failure to consolidate the consolidation theory of learning for sensorimotor adaptation tasks. **Journal of Neuroscience** 24: 8662-8671
- [45] FLANAGAN JR, Johansson RS (2003) Action plans used in action observation. **Nature** 424: 769-771
- Tong C, FLANAGAN JR (2003) Task-specific internal models for kinematic transformations. **Journal of Neurophysiology** 90: 578-585
- FLANAGAN JR, Vetter P, Johansson RS, Wolpert DM (2003) Prediction precedes control in motor learning. **Current Biology** 13: 146-150
- Wolpert DM, FLANAGAN JR (2003) Sensorimotor learning. In: Arbib MA (Ed) **The Handbook of Brain Theory and Neural Networks** (2<sup>nd</sup> Edition), pp. 1020-1023, Cambridge, MIT Press
- FLANAGAN JR, Johansson RS (2002) Hand Movements. In: Ramachandran VS (Ed) **Encyclopedia of the Human Brain**, Vol 2, pp 399-414, San Diego: Academic Press.
- [40] Munoz DP, LeVasseur AL, FLANAGAN JR (2002) Control of Volitional and Reflexive Saccades in Tourette's Syndrome. In: J Hyönä, DP Munoz, W Heide, R Radach (Eds) **The Brain's Eye: Neurobiological and clinical aspects of oculomotor research. Progress in Brain Research**, Vol 140, 467-81, Elsevier
- Nakano E, FLANAGAN JR, Imamizu H, Osu R, Yoshioka T, Kawato M (2002) Composition and decomposition learning of reaching movements under altered environments: An examination of the multiplicity of internal models **System and Computers in Japan** 33: 80-94
- Terao Y, Andersson NEM, FLANAGAN JR, Johansson RS (2002) Engagement of gaze in capturing targets for future sequential manual actions. **Journal of Neurophysiology** 88: 1716-1725
- Tong C, Wolpert DM, FLANAGAN JR (2002) Kinematics and dynamics are not represented independently in motor working memory: Evidence from an interference study. **Journal of Neuroscience** 22: 1108-1113
- Wigmore V, Tong C, FLANAGAN JR (2002) Visuomotor rotations of varying size and direction compete for a single internal model in motor working memory. **Journal of Experimental Psychology: Human Perception and Performance** 28: 447-457.
- [35] FLANAGAN JR, King S, Wolpert DM, Johansson RS (2001) Sensorimotor prediction and memory in object manipulation, **Canadian Journal of Experimental Psychology** 55: 89-97
- FLANAGAN JR, Lederman SJ (2001) Neurobiology: Feeling bumps and holes. **Nature** 412: 389-391 (Invited commentary)
- FLANAGAN JR, Lolley S (2001) The inertial anisotropy of the arm is accurately predicted during movement planning. **Journal of Neuroscience** 21: 1361-1369

- Johansson RS, Westling G, Bäckström A, FLANAGAN JR (2001) Eye-hand coordination in object manipulation. **Journal of Neuroscience** 21: 6917-6932
- Levasseur A, FLANAGAN JR, Riopelle R, Munoz DP (2001) Control of volitional and reflexive saccades in Tourette's syndrome. **Brain** 124: 2045-2058
- [30] Wolpert DM, Ghahramani Z, FLANAGAN JR (2001) Perspectives on motor learning. **Trends in Cognitive Sciences** 5: 487-494
- Wolpert DM, FLANAGAN JR (2001) Motor prediction. **Current Biology** 18: R729-R732
- FLANAGAN JR, Bandomir C (2000) Coming to grips with weight perception: effects of grasp configuration on weight judgments. **Perception & Psychophysics** 62: 1204-1219
- FLANAGAN JR, Beltzner MA (2000) Independence of perceptual and sensorimotor predictions in the size-weight illusion. **Nature Neuroscience** 3: 737-741
- Burstedt MKO, FLANAGAN JR, Johansson RS (1999) Effects of surface texture on the control of fingertip forces and torques in multidigit manipulation. **Journal of Neurophysiology** 82: 2393-2405
- [25] Ellis R, FLANAGAN JR, Lederman S (1999) The influence of visual illusions on grasp position. **Experimental Brain Research** 125: 109-114
- FLANAGAN JR, Burstedt MKO, Johansson RS (1999) The control of fingertip forces in multidigit manipulation. **Journal of Neurophysiology** 81: 1706-1717
- FLANAGAN JR, Jakobson LS, Munhall KG (1999) Anticipatory grip adjustments are observed in both goal-directed movements and movement tics in an individual with Tourette's syndrome. **Experimental Brain Research** 128: 69-75
- FLANAGAN JR, Nakano E, Imamizu H, Osu R, Yoshioka T, Kawato M (1999) Composition and decomposition of internal models in motor learning under altered kinematic and dynamic environments. **Journal of Neuroscience** 19: RC 34 (1-5)
- Majsak MJ, Kaminski T, Gentile AM, FLANAGAN JR (1998) The reaching movements of Parkinson's Disease subjects under self-determined maximal speed and visually cued conditions. **Brain** 121: 755-766
- [20] Wing AM, FLANAGAN JR (1998) Anticipating dynamic loads in handling objects. **Proceedings of the ASME Dynamic Systems and Control Division** 64: 139-143
- FLANAGAN JR, Wing AM (1997) The role of internal models in motor planning and control: evidence from grip force adjustments during movements of hand-held loads. **Journal of Neuroscience** 17: 1519-1528
- FLANAGAN JR, Wing AM (1997) Effects of grip force on judgments of hand-held loads. **Perception & Psychophysics** 59: 111-118
- Kinoshita H, Bäckström L, FLANAGAN JR, Johansson RS (1997) Planar torque effects on grip force during precision grip. **Journal of Neurophysiology** 78: 1619-1630
- Quinn LA, Hamel V, FLANAGAN JR, Kaminski T, Rubin A (1997) Control of multijoint arm movements in Huntington's disease. **Journal of Neurologic Rehabilitation** 11: 47-60
- [15] Wing AM, FLANAGAN JR, Richardson J (1997) Anticipatory postural adjustments in stance and grip. **Experimental Brain Research** 116: 122-130
- FLANAGAN JR, Rao AK (1995) Trajectory adaptation to a nonlinear visuomotor transformation: Evidence for motion planning in visually perceived space. **Journal of Neurophysiology** 74: 2174-2178

- FLANAGAN JR, Tresilian JR, Wing AM (1995) Grip force adjustments during rapid hand movements suggest that detailed movement kinematics are predicted. **Behavioral and Brain Sciences** 18: 753-754 (Commentary)
- FLANAGAN JR, Wing AM (1995) The stability of precision grip force during cyclic arm movements with a hand-held load. **Experimental Brain Research** 105: 455-464
- FLANAGAN JR, Wing AM, Allison S, Spencely A (1995) Effects of surface texture on weight perception when lifting objects with a precision grip. **Perception & Psychophysics** 57: 282-290
- [10] Ramsay JO, Wang X, FLANAGAN JR (1995) A functional data analysis of the pinch force of human fingers. **Applied Statistics** 44: 17-30
- FLANAGAN JR, Tresilian JR (1994) Grip-load force coupling: a general control strategy for transporting objects. **Journal of Experimental Psychology: Human Perception and Performance** 20: 944-957
- FLANAGAN JR, Ostry DJ, Feldman AG (1993). Control of trajectory modifications in reaching. **Journal of Motor Behavior** 25: 140-152
- FLANAGAN JR, Wing, AM (1993) Modulation of grip force with load force during point-to-point movements. **Experimental Brain Research** 95: 131-143
- FLANAGAN JR, Tresilian J, Wing AM (1993) Coupling of grip force and load force during arm movements with grasped objects. **Neuroscience Letters** 152: 53-56
- [5] Ostry DJ, FLANAGAN JR, Sergio LS (1993) Coordinate transformations in orofacial movements. **Behavioral and Brain Sciences** 15: 348-349 (Commentary)
- Ostry DJ, FLANAGAN JR (1992). Aspects of the equilibrium point hypothesis ( $\lambda$  model) for multi-joint movements. **Behavioral and Brain Sciences** 15: 784-786 (Commentary)
- Munhall KG, Ostry DJ, FLANAGAN JR (1991) Coordinate spaces in speech planning. **Journal of Phonetics** 19: 293-307
- Ostry DJ, Feldman AG, FLANAGAN JR (1991) The kinematics and control of frog hindlimb movement. **Journal of Neurophysiology** 65: 547-562
- Ostry DJ, FLANAGAN JR (1989) Human jaw movement in mastication and speech. **Archives of Oral Biology** 34: 685-693

## Books

- Wing AM, Haggard P, FLANAGAN JR (1996) (Eds) **Hand and Brain: Neurophysiology and Psychology of Hand Movement**. San Diego: Academic Press

## Book Chapters and Invited Journal Articles

- [25] Baugh LA, FLANAGAN JR (in press) Motor memory: when plans speak louder than actions. **Current Biology**. (Invited commentary and review)
- Baugh LA, FLANAGAN JR (2011) Motor memory: a declaration of non-independence. **Current Biology** 21: R70-72. (Invited commentary and review)
- FLANAGAN JR, Johansson RS (2010) Object representations used in action and perception. In: Danion F, Latash ML (Eds) **Motor Control**, Oxford University Press.
- FLANAGAN JR, Merritt K, Johansson RS (2009) Predictive mechanisms and object representations used in object manipulation. In: Hermsdörfer J, Nowak DA (Eds) **Sensorimotor Control of Grasping: Physiology and Pathophysiology**, pp 161-177, Cambridge University Press: Cambridge

- Johansson RS, FLANAGAN JR (2009) Sensory control of object manipulation. In: Hermsdörfer J, Nowak DA (Eds) **Sensorimotor Control of Grasping: Physiology and Pathophysiology**, pp 141-160, Cambridge University Press: Cambridge
- [20] Wolpert DM, FLANAGAN JR (2009) Forward models. In: T Bayne, A Cleeremans, P Wilken (Eds) **The Oxford Companion to Consciousness**, Oxford University Press: Oxford
- Johansson RS, FLANAGAN JR (2009) Sensory Control of Object Manipulation. In: Squire L, Albright T, Gage F, Spitzer N, Bloom F (Eds) **Encyclopedia of Neuroscience**, Volume 8, pp 593-604, Elsevier Press: Oxford
- Johansson RS, FLANAGAN JR (2007) Peripheral Sensory Mechanisms in Active Touch. In: Kass JH, Gardner EP (Eds) **The Senses: A Comprehensive Reference. Volume 5, Somatosensation**, Elsevier Press: Oxford
- Wolpert DM, FLANAGAN JR (2003) Sensorimotor Learning. In: M Arbib (Ed) **The Handbook of Brain Theory and Neural Networks** (2nd Ed), pp 1020-1023, MIT Press: Cambridge
- Nakano E, FLANAGAN JR, Imamizu H, Osu R, Yoshioka R, Kawato T (2002) Composition and decomposition learning of reaching movements under altered environments: An examination of the multiplicity of internal models. **Systems and Computers in Japan** 33(11): 80-94
- [15] Nakano E, FLANAGAN JR, Imamizu H, Osu R, Yoshioka T, Kawato M. (1998) Decomposition and combination of multiple internal models. **Transactions of the Institute of Electronics, Information and Communication Engineers**, 17-24
- FLANAGAN JR (1996) Action-perception coupling in judgments of hand-held loads. In: Wing AM, Haggard P, Flanagan JR (Eds) **Hand and Brain: Neurophysiology and Psychology of Hand Movement** (pp. 415-430), San Diego: Academic Press
- FLANAGAN JR, Wing AM, Haggard P (1996) The task at hand. In: Wing AM, Haggard P, Flanagan JR (Eds) **Hand and Brain: Neurophysiology and Psychology of Hand Movement**. (pp. 5-11), San Diego: Academic Press
- FLANAGAN JR (1992) Review of Perspectives on Movement Coordination (Wallace SA (Ed), North-Holland Press, 1991). **Journal of Phonetics** (Book review)
- FLANAGAN JR, Feldman AG, Ostry DJ (1992) Equilibrium trajectories underlying rapid target-directed arm movements. In: Stelmach G, Requin J (Eds) **Tutorials in motor control II** (pp 661-676), North-Holland Press
- [10] Ostry DJ, FLANAGAN JR, Feldman AG, Munhall KG (1992) Human jaw kinematics and Control. In: Stelmach G, Requin J (Eds) **Tutorials in motor control II**. North-Holland Press
- Ostry DJ, Munhall KG, FLANAGAN JR, Bregman AS (1992) Paths and trajectories in orofacial motion. **Perilus**, XIV, 35-39, Stockholm University.
- FLANAGAN JR, Feldman AG & Ostry DJ (1991) Equilibrium control vectors subserving rapid goal-directed arm movements. In: Requin J, Stelmach G (Eds) **Tutorials in motor neuroscience** (pp 357-367), Kluwer Academic Publishers
- Munhall KG, FLANAGAN JR, Ostry DJ (1991) Sensorimotor transformations and control strategies in speech. In: Tohkura Y, Sagisaka Y, Vatiokis-Bateson E (Eds) **Speech perception, production and linguistic structure**. OHM Publishing, Tokyo
- Ostry DJ, FLANAGAN JR, Feldman AG, Munhall KG (1991) Human jaw motion control in mastication and speech. In: Requin J, Stelmach G (Eds) **Tutorials in motor neuroscience**. Kluwer Academic Publishers

- [5] Donderi DC, Ostry DJ, Smiley A, Munhall KG, FLANAGAN JR (1990) Ergonomic analysis of the Resue Coordination Centres and Marine Rescue Sub-Centres. Search and Rescue, Canadian Coast Guard. (Technical Report)
- Feldman AG, Adamovich SV, Ostry DJ, FLANAGAN JR (1990) The origins of electromyograms - explanations based on the equilibrium point hypothesis. In: Winters J, Woo S (Eds) **Multiple muscle systems: biomechanics and movement organization** (pp 195-213), Springer-Verlag, London.
- FLANAGAN JR, Ostry DJ (1990) Trajectories of human multi-joint arm movements: evidence of joint level planning. In Hayward V, Khatib O (Eds) **Experimental robotics 1, lecture notes in control and information science** (pp 594-613), London: Springer-Verlag
- FLANAGAN JR, Ostry DJ, Feldman AG (1990) Control of human orofacial and multi-joint arm movements. In Hammond GR (Ed) **Advances in psychology: cerebral control of speech and limb movements**. Springer-Verlag
- Ioannides G, Angeles J, FLANAGAN R, Ostry DJ (1990) Robot calibration using least-squares and polar-decomposition filtering. In Hayward V, Khatib O (Eds) **Experimental robotics 1, lecture notes in control and information science**. Springer-Verlag

### Invited and Refereed Conference Presentations / Invited Talks

- Objects, actions, and tasks: representations used in sensorimotor control. Workshop on Models of Perceptual Learning and Perceptual Recognition, York University, U.K., March 2011.
- Sensorimotor control of object manipulation tasks. Department of Kinesiology and Physical Education, McGill University, February 2011.
- Gaze behaviour when performing and observing object manipulation tasks. Vision Science Colloquium, Universität Bielefeld, Germany, December 2009.
- [65] Predictive mechanisms and object representations used in object manipulation. Progress in Motor Control VII, Marseille, July 2009.
- Gaze behaviour when performing and observing object manipulation tasks. Workshop on Gaze Patterns in Dynamic Displays. Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig, June 2009.
- Representations of objects used in action and perception. The Fifth Computational Motor Control Workshop, Ben-Gurion University of the Negev, Israel, June 2009.
- Invited discussant: session on the equilibrium point hypothesis. Workshop on Computational Motor Control, Institute of Advanced Studies, The Hebrew University of Jerusalem, Israel, June 2009.
- Eye-hand coordination in object manipulation tasks. Vision in 3D Environments, Centre for Vision Research, York University, June 2009.
- [60] Representing object mechanics in object manipulation tasks. Keynote Lecture in Motor Learning and Control, North American Society for the Psychology of Sport and Physical Activity (NASPSPA) Conference, Niagara Falls, June 2008.
- Is the control of bimanual grasping more than the sum of the reaching parts? Annual Neural Control of Movement meeting, Naples, Florida, April 2008.
- Coming to grips with mechanics: predictive control mechanisms in object manipulation. Muscle, Limb, Brain Workshop, Mathematical Biosciences Institute, The Ohio State University, January 2008.

- Internal models in action. Frontiers of Theoretical Neuroscience Workshop. The Centre for Theoretical Neuroscience, University of Waterloo, April 2007.
- Sensorimotor and perceptual representations engaged when performing and observing object manipulation tasks. Kenneth Craik Club, University of Cambridge, December 2006.
- [55] Sensorimotor and perceptual representations engaged when performing and observing object manipulation tasks. Department of Neuroscience, University of Minnesota, December 2006.
- Sensorimotor control points used when performing and observing manipulation tasks. Bridging the gap between sensation and motor control. Giessen University, Germany, July 2006.
- Sensorimotor and perceptual representations engaged when performing and observing object manipulation tasks. Cognitive Studies Perception and Action Symposium, Cornell University, Ithaca, May 2006.
- Sensorimotor control points used when performing and observing manipulation tasks. Centre for Vision Research, York University, April 2006.
- Bayes meets Charpentier: Can the size-weight illusion be inverted by experience? Three-Dimensional Sensory and Motor Space: Probabilistic mechanisms of learning and development in sensorimotor systems. European Science Foundation. Barcelona, October 2005.
- [50] Proactive control of gaze when performing and observing manipulation tasks. From Action to Cognition: Predictive mechanisms in the perception of action and the effect of action on perceptual and cognitive processes, Paris, 2005.
- Prediction and control in manipulation. Multidisciplinary Approaches to Sensorimotor Integration: Old Questions Meet Novel Concepts, Okazaki, Japan, 2004
- Learning prediction before control. Motor Learning Satellite Workshop (to the Society for the Neural Control of Movement), Barcelona, 2004.
- Prediction and control in skilled action. Physical Education and Health Departmental Seminar Series, Queen's University, February 2004.
- Prediction and control in skilled action. Department of Psychology, Penn State University, January 2004.
- [45] Motor memory systems underlying in skill acquisition. Action Club Talk, Department of Kinesiology, Penn State University, January 2004.
- Eye-hand coordination in action and action observation. Three-Dimensional Sensory and Motor Space: Computational Mechanisms for the Generation and Perception of Action in 3D Space, Naples, Italy, 2003.
- Prediction and control in motor learning. Conference on Computational Sensorimotor Control (sponsored by the Institute of Movement Neuroscience, University College London), Grasse, France, 2003.
- Learning in eye-hand coordination. Nobel Symposium on Neural Control of Skilled Hand Movements: Cognitive and Computational Aspects. Stockholm, Sweden, 2003.
- Prediction and control in skilled action. Human Mobility Research Centre, Queen's University, November 2003.
- [40] Prediction and control in skilled object manipulation. Department of Biomedical Engineering, Johns Hopkins University, October 2003.
- Prediction and control in object manipulation. Behavioural Brain Sciences Centre, University of Birmingham, June 2003.

Prediction and control in object manipulation. Department of Psychology, McGill University, April 2003.

Invited Discussant, McDonnell-Pew Conference on Forward Models and Cognition, Barcelona, Spain, 2002.

Eye-hand coordination in action and the perception of action. Paper presented at the Annual Meeting of the International Society for Behavioural Neuroscience, Pointe-au-Pic, Quebec, 2002.

[35] Patterns of gaze-hand coordination when performing and perceiving object manipulation tasks. Conference on Eye-Hand Coordination, Kingston, Ontario, 2002.

Predictive and reactive coordination of gaze and hand movements in object manipulation. Paper presented at the Annual Neural Control of Movement meeting, Naples, Florida, 2002.

State-dependent organization of motor working memory. Paper presented at the Annual Society for the Neural Control of Movement meeting, Naples, Florida, 2002.

Learning multiple tasks: mapping the structure of motor working memory. Ashton Graybiel Spatial Orientation Laboratory, Brandeis University, March 2002.

Coming to grips with movement planning: what the hand tells us about predictive control in object manipulation. Progress in Motor Control III: From Basic Science to Applications, Montréal, Canada, 2001.

[30] Similar eye movement patterns during action and action observation: evidence for the motor theory of perception. Paper presented at the Annual Neural Control of Movement meeting, Seville, 2001.

Motor Working Memory Systems Underlying Skill Acquisition. Department of Psychology, University of Birmingham, England, March 2001.

Motor Working Memory Systems Underlying Skill Acquisition. Institute of Movement Neuroscience, University College London, January 2001.

Sensorimotor prediction and internal models in action and perception. Perspectives in Neuroscience Seminar Series, University of Western Ontario, February 2001.

Motor working-memory systems underlying skill acquisition. Workshop on Arm Motor Control. University of Birmingham, 2000.

[25] The notion of internal models in sensorimotor control: an overview. Paper presented at the Congress of the Scandinavian Physiological Society, Umeå, Sweden (Abstract published in *Acta Physiologica Scand*), 1999.

The role of internal models of object and limb dynamics in motion planning. Department of Physiology Seminar Series, Queen's University, January 1999.

Institute of Movement Neuroscience, University College London and Gatsby Computational Neuroscience Unit, June 1999

Forward and inverse models in motion planning: evidence from grip force adjustments during object transport. Paper presented at the Japan/Canada Neuroscience Meeting, Tokyo, Japan, 1998.

Coming to grips with internal models. Paper presented at the 8th annual Society for the Neural Control of Movement meeting, Key West, 1998.

[20] Motion planning revealed by anticipatory grip force adjustments of the hand. Paper presented at the Sensory Motor Function of the Hand workshop, University of Birmingham, Birmingham, U.K., 1998.

- Control of forces and torques in multi-digit manipulation. Paper presented at the Neurophysiology of the Hand Symposium, Ascona, Switzerland, 1998.
- Anticipatory grip force adjustments during intentional and non-intentional movements in Tourette's Syndrome. Paper presented at the Neurophysiology of the Hand Symposium, Ascona, Switzerland, 1998.
- Forward and inverse models in motion planning: evidence from grip force adjustments during object transport. Advanced Telecommunications Research (ATR) Institute, Kyoto, Japan, April 1998.
- Levels of sensorimotor processing in the planning and control of arm movements. Université de Montréal, Dept. of Physiology, October 1997.
- [15] Levels of sensorimotor processing in the planning and control of arm movements. Paper presented at the XXVI Meeting of the International Congress of Psychology, Montréal. Abstract published in *International Journal of Psychology* 31: 2344-2344, 1996.
- The role of internal models of dynamic in motion planning: evidence from grip force adjustments during hand movements. Paper presented at Workshops in Sensorimotor Control: Measuring Body Motion, Bangor, Wales, 1996.
- Eastern Motor Group, Cambridge, U.K., July 1996.
- Sobell Department of Neurophysiology, Institute of Neurology, London, April 1996
- Control of reaching movements. Paper presented at Neuromotor Processes in Posture and Movement, Columbia University, New York, 1995.
- [10] Department of Physiology, Umeå University, Umeå, Sweden, August 1995
- Neuroscience Seminar Series, Queen's University, Kingston, March 1995
- University of Arizona State, Tempe, February 1995
- Effects of a load applied to the wrist on the control of grip force during arm movement. Paper presented at Sensorimotor Function of the Hand: Mechanics and Control, Ascona, Switzerland, 1994.
- The effect of surface texture on weight perception when lifting objects with a precision grip. Paper presented at Sensorimotor Function of the Hand: Mechanics and Control, Ascona, Switzerland, 1994.
- [5] The role of internal dynamic models in motion planning and control. Alfred I du Pont Institute/University of Delaware, Wilmington, May 1994.
- Center for Neurobiology and Behavior, Columbia University, New York, January 1994
- University of Tübingen, Tübingen, Germany, March, 1993.
- Equilibrium control vectors subserving goal-directed arm movements. Paper presented at the NATO Advanced Study Institute on Motor Neuroscience, Calcatoggia, Corsica, 1990.
- Trajectories of human multi-joint arm movements: Evidence of joint level planning. Paper presented at First International Symposium on Experimental Robotics, Montreal, 1989.

### **Conference Presentations / Published Abstracts**

- Ingram JN, Flanagan JR, Wolpert DM (2012) A context-dependent process mediates decay in motor adaptation. Poster to be presented at the Annual Meeting of the Society for the Neural Control of Movement, Venice, Italy.

- Reichelt A, Ash A, Baugh LA, Johansson RS, FLANAGAN JR (2011) Seeing is predicting: rapid parametric motor learning through action observation. Poster presented at the 41<sup>st</sup> Annual Meeting of the Society for Neuroscience, Washington, D.C.
- Baugh LA, Kao M, FLANAGAN JR (2001) Role of priors and sensorimotor memory when predicting weight for object manipulation. Poster presented at the 41<sup>st</sup> Annual Meeting of the Society for Neuroscience, Washington, D.C.
- Daliri A, FLANAGAN JR, Max L (2011) Sensorimotor learning in typically developing and stuttering children. Poster presented at the 41<sup>st</sup> Annual Meeting of the Society for Neuroscience, Washington, D.C.
- Stewart BM, Khan A, FLANAGAN JR (2011) Memory for position and orientation in a reaching task. Poster presented at the 41<sup>st</sup> Annual Meeting of the Society for Neuroscience, Washington, D.C.
- [95] Markovik S, Baugh LA, FLANAGAN JR (2011) Rapid adaptation of reactive sensorimotor control processes when lifting objects. Poster presented at the 41<sup>st</sup> Annual Meeting of the Society for Neuroscience, Washington, D.C.
- Baugh LA, Hoe E, FLANAGAN JR (2011) Reversing the reversal: Virtual tool use decreases movement costs and restores rapid online corrections during conditions of visuomotor reversal. Talk presented at the Annual Meeting of the Society for the Neural Control of Movement, Puerto Rico.
- Ingram JN, Howard IS, FLANAGAN JR, Wolpert DM (2011) A single-rate context-dependent process underlies rapid adaptation to familiar object dynamics. Poster presented at the Annual Meeting of the Society for the Neural Control of Movement, Puerto Rico.
- Diamond JS, Dorris MC, FLANAGAN JR (2011) Rapid implementation of eye and hand foraging strategy in a novel free-choice movement task. Talk presented at the Canadian Physiology Society Meeting, St. Gabriel, Quebec
- Markovik S, Baugh LA, FLANAGAN JR (2011) Rapid intelligent adaptation of reactive force control when lifting objects. Talk presented at the Canadian Physiology Society Meeting, St. Gabriel, Quebec
- [90] Baugh LA, Hoe E, FLANAGAN JR (2010) Presentation of a visual schema reduces reaction time costs associated with performing a visuomotor reversal. Poster presented at the 40th Annual Meeting of the Society for Neuroscience, San Diego, California
- Diamond JS, Dorris MC, FLANAGAN JR (2010) The influence of motor cost and reward value in a reach foraging task. Poster presented at the 40th Annual Meeting of the Society for Neuroscience, San Diego, California
- Moreno-Briseño P, Campos-Romo A, FLANAGAN JR, Fernández-Ruiz J (2009) Visuomotor processing: neural correlates of sensorimotor transformations. Poster presented at the 39th Annual Meeting of the Society for Neuroscience, Chicago, Illinois
- Yak A, FLANAGAN JR (2009) Size-weight maps used when lifting objects and judging their weights. Poster presented at the 39th Annual Meeting of the Society for Neuroscience, Chicago, Illinois
- Yak A, FLANAGAN JR (2009) Representation of distinct size-weight maps used when lifting objects and judging their weights. Poster presented at the Annual Neural Control of Movement meeting, Hawaii.

- [85] Kan MC, Boissé L, Munoz DP, Scott SH, FLANAGAN JR (2008) Early shoulder muscle activity is tuned to target direction during fast reaching under a visuomotor rotation. Poster presented at the 38th Annual Meeting of the Society for Neuroscience, Washington, D.C.
- Prokopenko RA, Max L, FLANAGAN JR (2008) Sensorimotor Learning in Stuttering Children: Nonspeech Movements with Non-Veridical Feedback. Poster presented at the American Speech Language Hearing Association convention, Chicago, Illinois.
- Ahmed AA, Wolpert DM, FLANAGAN JR (2008) Flexible representations of dynamics are used in object manipulation. Paper presented at the North American Congress on Biomechanics, Ann Arbor, Michigan.
- Ingram JN, Howard IS, FLANAGAN JR, Wolpert DM (2008) The representation of object dynamics during object manipulation. Poster presented at Cambridge Neuroscience 2008.
- Lee V, Kelley E, FLANAGAN JR (2008) Action prediction in individuals with autism spectrum disorder. Paper presented at the International Meeting for Autism Research, London.
- [80] Tzelnic T, Kuhlmeier VA, Latimer S, FLANAGAN JR (2008). Predictive Gaze to Novel Animate and Inanimate Entities in Adults and Infants. Poster presented at The International Conference on Infant Studies. Vancouver, Canada.
- Ahmed AA, Wolpert DM, FLANAGAN JR (2007) Representation of object dynamics in bimanual object manipulation. Paper presented at the 37th Annual Meeting of the Society for Neuroscience, San Diego.
- Bursztyn LLCD, FLANAGAN JR (2007) Sensorimotor memory of weight asymmetry in object manipulation tasks. Paper presented at the 37th Annual Meeting of the Society for Neuroscience, San Diego.
- Duncan JRL, Kurtzer I, Fernandez-Ruiz J, FLANAGAN JR (2007) Visuomotor adaptation does not transfer from curved to straight line reaching movements. Paper presented at the 37th Annual Meeting of the Society for Neuroscience, San Diego.
- Fernandez-Ruiz J, Wong W, Armstrong IT, FLANAGAN JR (2007) Distinct processes underlie reaching under visuomotor and mental rotations. Paper presented at the 37th Annual Meeting of the Society for Neuroscience, San Diego.
- [75] FLANAGAN JR, Caldwell J, Fernandez-Ruiz J (2007) Different mechanisms underlie the control of visually guided grasping and reaching. Paper presented at the 37th Annual Meeting of the Society for Neuroscience, San Diego.
- Prokopenko RA, Max L, FLANAGAN JR (2007) Adaptation to new sensorimotor mappings in individuals who stutter. Paper presented at the Progress in Motor Control VI meeting, Sao Paulo, Brazil.
- Prokopenko RA, Max L, FLANAGAN JR (2007) Prediction of self-generated movement consequences in individuals who stutter. Paper to be presented at the 37th Annual Meeting of the Society for Neuroscience, San Diego.
- Bowman MC, FLANAGAN JR (2006) Control of gaze when manipulating objects with different mechanical properties. Paper presented at the 36th Annual Meeting of the Society for Neuroscience, Atlanta.
- Tong C, Bursztyn LLCD, FLANAGAN JR (2006) Object-centered representations of dynamics acquired in motor learning. Paper presented at the 36th Annual Meeting of the Society for Neuroscience, Atlanta.

- [70] Armstrong IT, Judson M, FLANAGAN JR (2005) Eye-hand coordination following adaptation to a visuomotor reversal. Paper presented at the 35th Annual Meeting of the Society for Neuroscience, Washington, D.C.
- Bowman MC, FLANAGAN JR (2005) Gaze is controlled so as to capture the consequences of action. Paper presented at Three-Dimensional Sensory and Motor Space: Probabilistic mechanisms of learning and development in sensorimotor systems. European Science Foundation. Barcelona.
- Rotman G, FLANAGAN JR (2005) Eye movements during action observation. Paper presented at Three-Dimensional Sensory and Motor Space: Probabilistic mechanisms of learning and development in sensorimotor systems. European Science Foundation. Barcelona.
- Bursztyn LLCD, FLANAGAN JR (2005) Simultaneous learning of opposing object dynamics. Paper presented at the 35th Annual Meeting of the Society for Neuroscience, Washington, D.C.
- Armstrong IT, Pari G, Bowman MC, FLANAGAN JR (2004) Eye-hand coordination in Parkinson's disease. Paper presented at the 34th Annual Meeting of the Society for Neuroscience, San Diego.
- [65] Bowman MC, FLANAGAN JR (2004) Peripheral vision of hand used to guide predictive saccades in an object manipulation task. Paper presented at the 34th Annual Meeting of the Society for Neuroscience, San Diego.
- Tong C, FLANAGAN JR (2004) Eye-hand coordination in drawing and tracing. Paper presented at the 34th Annual Meeting of the Society for Neuroscience, San Diego.
- Bowman MC, FLANAGAN JR (2004) Visual and haptic feedback differentially mediate the control of eye-hand coordination in manipulation tasks. Paper presented at the Annual Neural Control of Movement meeting, Barcelona.
- Joyce DW, Hamilton A, FLANAGAN JR, Frith CD, Wolpert DM (2004) Kinematic properties affecting perceptual judgments in an Action Observation Task. Paper presented at the Annual Neural Control of Movement meeting, Barcelona.
- Davidson PR, Wolpert DM, Scott SH, FLANAGAN JR (2003) Novel dynamic environments applied as forces or torques: the role of mechanosensory feedback in motor learning and memory. Paper presented at the 33rd Annual Meeting of the Society for Neuroscience, New Orleans.
- [60] Bowman MC, Armstrong IT, FLANAGAN JR (2003) Contribution of visual and haptic feedback in the control of eye-hand coordination in manipulation tasks. Paper presented at the 33rd Annual Meeting of the Society for Neuroscience, New Orleans.
- Klassen J, Tong C, FLANAGAN JR (2003) Learning and recall of kinematic and dynamic sensorimotor transformations does not require awareness. Paper presented at the 33rd Annual Meeting of the Society for Neuroscience, New Orleans.
- Tong C, FLANAGAN JR (2003) Eye-hand coordination in skill acquisition. Paper presented at the 33rd Annual Meeting of the Society for Neuroscience, New Orleans.
- Rombough SR, FLANAGAN JR, Scott SH (2003) Single-joint power strategy for initiating multi-joint arm movements. Paper presented at the Winter Meeting of the Canadian Physiological Society, January, Quebec City.
- Rombough S, FLANAGAN JR, Scott SH (2002) Trajectory constraints in multi-directional whole-arm movements. Paper presented at the 32nd Annual Meeting of the Society for Neuroscience, Orlando, Florida.

- [55] Caithness G, Hutchinson E, FLANAGAN JR (2002) Independent learning of opposing force-fields using visual cues about dynamics. Paper presented at the Annual Neural Control of Movement meeting, Naples, Florida.
- FLANAGAN JR, LeVasseur AL, Riopelle RJ, Munoz DP (2001) Control of voluntary and reflexive saccades in Tourette's syndrome. Paper presented at the 31th Annual Meeting of the Society for Neuroscience, San Diego.
- Kozlov AP, Terao Y, FLANAGAN JR, Johansson RS (2001) Comparison of eye-hand coordination in unimanual and bimanual manipulatory tasks. Paper presented at the European Conference on Eye Movements, Turku, Finland.
- Maruoka EN, Armstrong IT, Scott SH, Munoz DP, FLANAGAN JR (2001) Eye-Hand Coordination and Dissociation in a Pro- and Anti-movement Paper presented at the 31th Annual Meeting of the Society for Neuroscience, San Diego.
- Munoz DP, LeVasseur AL, FLANAGAN JR, Riopelle RJ (2001) Control of volitional and reflexive saccades in Tourette's syndrome. Paper presented at the European Conference on Eye Movements, Turku, Finland.
- [50] Terao Y, FLANAGAN JR, Johansson RS (2001) Vision and eye movements in the control of memory guided tasks performed with a hand-held tool. Paper presented at the Annual Neural Control of Movement meeting, Seville.
- Tong C, Wolpert DM, FLANAGAN JR (2001) State-dependent interference between kinematic and dynamic learning. Paper presented at the 31st Annual Meeting of the Society for Neuroscience, San Diego.
- Tong C, FLANAGAN JR (2001) Task-specific internal models for kinematic transformations. Paper presented at the Annual Neural Control of Movement meeting, Seville.
- FLANAGAN JR, Beltzner MA (2000) Independence of sensory and cognitive predictions in the size-weight illusion. Paper presented at the 30th Annual Meeting of the Society for Neuroscience, New Orleans.
- Kozlov AP, Terao Y, FLANAGAN JR, Johansson RS (2000) Role of eye movements in control of a bimanual manipulatory task. Paper presented at the 30th Annual Meeting of the Society for Neuroscience, New Orleans.
- [45] Tong C, Wigmore V, Beninger RJ, FLANAGAN JR (2000) Visuomotor rotations of varying size and direction compete for a single internal model in working motor memory. Paper presented at the 30th Annual Meeting of the Society for Neuroscience, New Orleans.
- Burstedt MKO, FLANAGAN JR, Johansson RS (1999) Control of grasp stability in humans under various frictional conditions during multi-digit lifting. Paper presented at the Congress of the Scandinavian Physiological Society, Umeå, Sweden.
- FLANAGAN JR, Johansson RS (1999) Gaze-hand coordination subserving motion planning in object manipulation. Paper presented at the 29th Annual Meeting of the Society for Neuroscience, Miami Beach.
- Johansson RS, FLANAGAN JR (1999) Contact points during manipulation are probed by saccadic eye fixations. Paper presented at the 29th Annual Meeting of the Society for Neuroscience, Miami Beach.
- Johansson RS, Westling G, Bäckström A, FLANAGAN JR (1999) Saccadic eye fixations in manipulatory tasks. Paper presented at the Congress of the Scandinavian Physiological Society, Umeå, Sweden.

- [40] Nakano E, FLANAGAN JR, Imamizu H, Osu R, Yoshioka T, Kawato M (1999) Adaptation to altered kinematics and dynamics in reaching movements based on composition and decomposition of learned internal models. Paper presented at the 29th Annual Meeting of the Society for Neuroscience, Miami Beach.
- Wing AM, FLANAGAN JR (1998) Acquiring the forward model. Paper presented at the Experimental Physiology Society, Oxford, U.K.
- FLANAGAN JR, Burstedt MKO, Johansson RS (1997) Control of fingertip forces in multi-digit manipulation Paper presented at the 27th Annual Meeting of the Society for Neuroscience, New Orleans, Soc Neurosci Abstr, Vol 23, Part 1, p 2092
- FLANAGAN JR, Wing AM (1996) Internal Models of Dynamics in Motor Learning and Control. Paper presented at the 26th Annual Meeting of the Society for Neuroscience, Washington, DC, Soc Neurosci Abstr, Vol 22, Part 2, p 897
- Jakobson LS, FLANAGAN JR, Munhall KG (1996) Anticipatory control of precision grip force in Tourette's Syndrome. Paper to be presented at the 26th Annual Meeting of the Society for Neuroscience, Washington, DC, Soc Neurosci Abstr, Vol 22, Part 1, p 427
- [35] Quinn LA, FLANAGAN JR, Kaminski TR (1996) Effects of accuracy constraints on multijoint arm movements in Huntington's disease. Paper to be presented at the 26th Annual Meeting of the Society for Neuroscience, Washington, DC, Soc Neurosci Abstr, Vol 22, Part 3, p 2039
- Wing AM, FLANAGAN JR, Richardson J (1996) Anticipatory modulation of posture and grip. Paper presented at the Experimental Physiology Society, London
- Duff S, FLANAGAN JR (1995) Coupling between release aperture and anticipated object size. Paper to be presented at the 25th Annual Meeting of the Society for Neuroscience, San Diego, Soc Neurosci Abstr, Vol 21, Part 1, p 422
- FLANAGAN JR, Rao AK (1995) Learning non-linear visuomotor mappings. Paper presented at the 25th Annual Meeting of the Society for Neuroscience, San Diego, Soc Neurosci Abstr, Vol 21, Part 3 p 1922
- FLANAGAN JR, Rao AK (1995) Motion planning in perceived coordinates. Paper presented at the 5th annual Society for the Neural Control of Movement meeting, Key West
- [30] Majsak MJ, Gentile AM, FLANAGAN JR (1995) Visual motion cues and paradoxical movements in Parkinson's disease patients. Paper to be presented at the 25th Annual Meeting of the Society for Neuroscience, San Diego, Soc Neurosci Abstr, Vol 21, Part 2, p 1249
- Majsak MJ, FLANAGAN JR, Gentile AM (1995) Modulation of ballistic reaching movements in Parkinson's disease: the effects of a moving versus stationary target. Paper presented at annual meeting of the American Physical Therapy Association: Combined Sections, Reno
- Wing AM, FLANAGAN JR, Tresilian JR (1995) Object dynamics and the anticipatory modulation of grip force. Paper presented at the 8th International Conference on Perception and Action, Marseille
- Wing AM, FLANAGAN JR (1995) Adaptation of grip force to load: Kinematics in motion planning. Paper presented at the Experimental Physiology Society, Cambridge
- FLANAGAN JR (1994) The effect of surface texture on weight perception when lifting objects with a precision grip. Paper presented to the British Psychological Society, Exeter
- [25] FLANAGAN JR (1994) Coupling of grip and load force during cyclic arm movements. Paper presented to the British Psychological Society, Exeter

- FLANAGAN JR, Wing AM (1994) The effect of surface texture on the perception of weight when lifting with a precision grip. Paper presented at the 24th Annual Meeting of the Society for Neuroscience, Miami Beach, Soc Neurosci Abstr, Vol 20, Part 2, p 1199
- Quinn LA, Hamel V, FLANAGAN JR, Kaminski TR (1994) Control of multijoint arm movements in Huntington's disease. Paper presented at the 24th Annual Meeting of the Society for Neuroscience, Miami Beach, Soc Neurosci Abstr, Vol 20, Part 2, p 1199
- FLANAGAN JR, Wing AM (1993) Coupling of grip force and load force during arm movements. Paper presented at the Brain Research Association, St. Andrews
- FLANAGAN JR, Wing AM (1992) Human force control: data and modelling. Paper presented at the 22nd Annual Meeting of the Society for Neuroscience, Anaheim, Soc Neurosci Abstr, Vol 18, Part 2, p 1054
- [20] Feldman AG, FLANAGAN JR, Ostry DJ (1991) Control variables underlying human arm and jaw movements. Paper presented at Sixth International Conference on Event Perception and Action. Amsterdam
- FLANAGAN JR, Feldman AG, Ostry DJ (1991) A model of human target-directed horizontal arm movement. Paper presented at 21st Annual Meeting of the Society for Neuroscience, New Orleans
- Ostry DJ, Feldman AG, FLANAGAN JR, Munhall KG (1991) Determinants of jaw movement in mastication and speech. Paper presented at 21st Annual Meeting of the Society for Neuroscience, New Orleans
- Ostry DJ, FLANAGAN JR, Feldman AG (1991) The control and kinematics of human jaw movement. Paper presented at the 121st meeting of the Acoustical Society of America, Baltimore, MD
- Ostry DJ, Munhall KG, FLANAGAN JR (1991) Paths and trajectories in tongue and jaw movement. Paper presented at The Symposium on Current Phonetic Research Paradigms: Implications for Speech Motor Control. Stockholm
- [15] Feldman AG, FLANAGAN JR, Ostry DJ (1990) Equilibrium vectors spaces for the control of multi-muscle systems. Paper presented at the 20th Annual Meeting of the Society for Neuroscience, St. Louis, Soc Neurosci Abstr, Vol 16, Part 2, p 1088
- FLANAGAN JR, Feldman AG, Ostry DJ (1990) Equilibrium vectors underlying movements to displaced targets. Paper presented at the 20th Annual Meeting of the Society for Neuroscience, Soc Neurosci Abstr, St. Louis, Vol 16, Part 2, p 1088
- Munhall KG, Ostry DJ, FLANAGAN JR (1990) Coordinate spaces in speech planning. Paper presented at the 2nd Seminar in Speech Production: Models and Data, Leeds, UK
- Munhall KG, Ostry DJ, FLANAGAN JR (1990) Scale changes in speech movements. Paper presented at the Advanced Telecommunications Research Workshop, Kyoto, Japan
- Ostry DJ, FLANAGAN JR, Feldman AG (1990) Human jaw motion control in mastication and speech. Paper presented at the NATO Advanced Study Institute on Motor Neuroscience, Calcatoggia, Corsica
- [10] Ostry DJ, Munhall KG, FLANAGAN JR, Feldman AG (1990) Control of human jaw movement in mastication and speech. Paper presented at the 20th Annual Meeting of the Society for Neuroscience, St. Louis, Soc Neurosci Abstr, Vol 16, Part 2, p 1319

Sergio LE, FLANAGAN JR, Feldman AG, Ostry DJ (1990) 3-d kinematic analysis of hindlimb wiping movements in spinal frogs. Paper presented at the 20th Annual Meeting of the Society for Neuroscience, St. Louis, Soc. Neurosci Abstr., Vol 16, Part 1, p 117

FLANAGAN JR, Feldman AG, Ostry DJ (1989) The equilibrium point model for two joint arm movement control. Paper presented at the 19th Annual Meeting of the Society for Neuroscience, Phoenix, Soc. Neurosci Abstr, Vol 15, Part 1

Ioannides G, Angeles J, FLANAGAN JR, Ostry DJ (1989) Robot calibration using least-squares and polar-decomposition filtering. Paper presented at First International Symposium on Experimental Robotics, Montreal

Ostry DJ, Feldman AG, FLANAGAN JR, Adamovich SV, Karpovich A (1989) Kinematic properties of frog hindlimb movement organization. Paper presented at VIth International Symposium on Motor Control, Albena, Bulgaria

[5] Ostry DJ, Feldman AG, FLANAGAN JR, Adamovich SV, Karpovich A, Sergio LE (1989) Kinematic properties of frog hindlimb movement organization. Paper presented at the 19th Annual Meeting of the Society for Neuroscience, Phoenix, Soc Neurosci Abstr, Vol 15, Part 1

FLANAGAN JR, Ostry DJ (1988) Kinematics of two and three link saggital arm and arm with pointer movements. Paper presented at 18th Annual Meeting of the Society for Neuroscience, Toronto, Soc Neurosci Abstr, Vol 14, Part 2

Ostry DJ, FLANAGAN JR (1987) Human jaw movement kinematics in mastication and speech. Paper presented at the 17th Annual Meeting of the Society for Neuroscience, New Orleans, Soc Neurosci Abstr, Vol 13, Part 1, p 12

Ostry DJ, FLANAGAN JR, Cooke JD (1986) The shape of the velocity curve varies with movement duration: Evidence from human arm movement, locomotion, mastication and speech. Paper presented at the 16th Annual Meeting of the Society for Neuroscience, Washington, D.C., Soc Neurosci Abstr, Vol 12, Part 2, p 971

FLANAGAN JR, Ostry DJ, Hoshizaki TB, Gelinis MP (1985) Kinematic properties of human locomotor movements. Paper presented at 15th Annual Meeting of the Society for Neuroscience, Dallas, Soc Neurosci Abstr, Vol 11, Part 1, p 702

## Training

### Bachelor's Theses

Christina Bandomir (1997-98), Sonja Krawesky (1997-98), Jennifer Deans\* (1997-98), Sarah Lolley (1998-99), Mike Beltzner (1999-2000), Virginia Wigmore (2000-01), Cinda Elliot (2001-02), Emma Hutchinson† (2001-02), Jessica Klassen (2002-03), Melissa Judson, Ewen MacKinnon‡, Kyle Merritt (2003-04), Jennifer Bittner (2004-05), Katie Douglas (2005-06), Julia Marr†, Lianne Wong†, William Wong† (2006-07), Michelle Kan†, Yin Lam† (2007-2008), Daniel Berant†, Stephanie Kenny†, Sarah Charpentier (2008-2009), Erica Hoe† (2009-2010), Alyssa Ash, Michelle Kao† (2010-2011)

\*Mechanical Engineering, †Life Sciences, ‡Engineering Physics (otherwise Psychology)

### Graduate Students

Mike Majsak*	Ed.D.	1995-1996	
Lori Quinn*	Ed.D.	1995-1996	
Ashwini Rao*	M.Ed.	1995-1996	
Christine Tong†	M.A.	1999-2001	Funding: NSERC 1999-2003, CIHR 2003-2007
	Ph.D.	2001-	

Erin Maruoke	M.Sc.	2000-2003	Co-supervisors: Doug Munoz, Stephen Scott
Graham Caithness <sup>†</sup>	M.A.	2001-2004	
Miles Bowman <sup>‡</sup>	M.A.	2002-2004	Funded by NSERC 2003-2007
	Ph.D.	2004-2009	
Lulu Bursztyn <sup>‡</sup>	M.D./M.Sc.	2004-2007	Funded by NSERC 2004-2007
Joe Duncan <sup>†</sup>	M.Sc.	2006-2008	Funded by NSERC 2007-2008
Amelie Yak <sup>†</sup>	M.Sc.	2008-	
Jonathan Diamond <sup>‡</sup>	Ph.D.	2009-	
Simona Markovik <sup>‡</sup>	M.Sc.	2009-	Funded by NSERC
Brandie Stewart <sup>‡</sup>	Ph.D.	2009-	Funded by NSERC
Andreas Reichelt	Ph.D.	2010-	

\*Teachers College, Columbia University, <sup>†</sup>Psychology Graduate Program, <sup>‡</sup>Neuroscience Graduate Program

### Postdoctoral Fellows

Rob Ellis, Ph.D.:	1996-1997	Co-supervisor: Susan Lederman
Irene Armstrong, Ph.D.	2000-2002	Co-supervisor: Doug Munoz
Stuart Marcovitch, Ph.D.	2001-2002	
Paul Davidson, Ph.D.	2003	
Gerben Rotman, Ph.D.	2003-2006	
	2006-2007	Co-supervisor: Pat Stroman
Gabriel Robles-De-La-Torre, Ph.D.:	2004-2005	
Lee Baugh	2009-	
Aarlenie Khan	2009-	Co-supervisor: Doug Munoz
Jason Gallivan	2011-	

### Teaching Experience

*Teachers College, Columbia University*

Analysis of Human Movement, Signals and Systems Analysis

*Queen's University*

Undergraduate Courses: Introduction to Psychology, Statistics in Psychology, Advanced Experimental Psychology, Advanced Topics in Cognitive Psychology: Motor Control, Advanced Topics in Cognitive Psychology: Cognitive Neuroscience

Graduate Courses: Motor Systems and Motor Control, Human Cognitive Neuroscience, Current Concepts in Sensorimotor Control (Psychology/Physiology/Anatomy and Cell Biology)

### External Examiner

Paul Gribble, Department of Psychology, McGill University: Ph. D., 1997

Pascale Pigeon, Ecole Polytechnique, Université de Montréal: Ph.D., 1998

Alice Whitney, Sobell Department of Neurophysiology, Institute of Neurology, University College London: Ph.D., 2001

Denise Henriques, Department of Psychology, York University: Ph.D., 2002, "Visuo-motor transformations for eye-hand coordination".

Chen-ju Lai, Department of Rehabilitation Science, Queen's University: M.Sc., 2002, "Reaching movement with purposeful activity and/or visuotemporal cue in people with Parkinson's Disease".

Nicole Malfait, Department of Psychology, McGill University: Ph. D., 2004, "Characterization of dynamics learning and generalization".

Nicholas Cothros, Graduate Program in Neuroscience, University of Western Ontario: M. Sc., 2004, "Role of primary motor cortex in consolidation and interference".

Daniel Lametti, Department of Psychology, McGill University: M.Sc., 2007, "On the control of movement variability through the regulation of limb impedance".

Nicholas Cothros, Graduate Program in Neuroscience, University of Western Ontario: Ph. D., 2008, "The Learning of Multiple Motor Skills".

Andrew Mattar, Department of Psychology, McGill University: Ph. D., 2009, "Generalization of dynamics learning across direction, distance and time".

## **Administrative Experience**

### **Departmental Administration (Queen's Psychology)**

Undergraduate Committee: 1996-1999

Academic Advisor: 1996-1999

Merit Committee: 1996-1997, 2008-2009

Departmental Computer Officer: 1997-1998

Safety Committee: 1997-2000, Co-Chair

Graduate Committee: 1999-2000; 2001-2007

Priorities and Procedures Committee: 2001-2007

Chair of Brain, Behaviour and Cognitive Science Graduate Program: 2001-2007

### **University Administration (Queen's)**

Neuroscience Seminar Series Co-coordinator: 1996-2000

Academic Research Council, Division IV: 2000

Queen's Centre for Neuroscience Studies Executive: 2000, 2001-2003, 2006-2007

Queen's Centre for Neuroscience Studies Training Committee, 2003

Queen's Centre for Neuroscience Studies Graduate Committee, 2008-

Queen's Postdoctoral Working Group, 2008-

### **Extramural Administration**

Canadian Action Perception Network (CAPnet) Steering Committee, 2008-

Neural Control of Movement (NCM) Society Board Member, 2008-