

B.J. Frost, MA, PhD, LLD (hc), FRSC., FAAAS., FCPA

CURRICULUM VITAE

March 2016

Name: Barrie James Frost
Date of Birth: 3rd June 1939
Place of Birth: Nelson, New Zealand
Marital Status: Married, 3 adult children., 6 grandchildren.
Citizenship: Canada/New Zealand (Dual Citizenship)

Education:

Christchurch Teachers' College, N.Z., 1957-1959; Teachers Certificate, 1959, (First five merit list)
University of Canterbury, N.Z., 1957-61; B.A. 1961; M.A. (hons.), 1964.
Dalhousie University, Canada, 1964-67; Ph.D., 1967
University of California, Berkeley, 1968-69; P.D.F.

Scholarships, Fellowships, and Awards:

N.Z. Teachers University Scholarship, 1959.
N.Z. Teachers Biology Scholarship, 1959 (declined).
N.Z. Teachers Physical Education Scholarship (declined).
Dalhousie University Graduate Scholarship, 1964-65.
“Science Exhibition of 1851” Overseas Scholarship, U.K., 1965 (declined).
Rutherford Scholar of the Royal Society, London, 1965-67. (Only one of these awards is given each year throughout the British Commonwealth, with preference given to experimental physicists).
Canada Council Fellowship, 1975-76.
National Research Council of Canada Travelling Fellowship, 1975-76.
Visiting Fellowship, Physiology Dept., John Curtin School for Medical Research, Institute for Advanced Studies, The Australian National University.
Visiting Research Fellow, National Vision Research Inst., University of Melbourne, 1982-83.
William Evans Visiting Fellow, University of Otago, Dunedin, New Zealand, April, 1983.
Canadian National Health Research Scholar, 1984-1989.
Visiting Research Fellow, Agency of Industry Science and Technology, Tsukuba, Japan, October, 1987.
Honorary Professor, Zhejiang University, Hangzhou, Peoples Republic of China, 1988-Present
James McKeen Cattell Award, American Psychological Association, 1989-90.
Visiting Scientist, The Salk Institute, and Department of Neuroscience, University of California, San Diego, 1989-90.
Queen's Alumni Prize for Teaching Excellence, 1993.
Queen's University Prize for Excellence in Research, 1993.
Max Bell Fellow, Canadian Institute for Advanced Research, 1995 to 2004.
Fellow, Programme in Human Development, Canadian Institute for Advanced Research
Erskine Fellow, Psychology Department, University of Canterbury, New Zealand, 1996.
Alexander von Humboldt Forschungspreis (Research Prize), Von Humboldt Stiftung, Germany, 1996.
Honorary LLD from Concordia University, June 2000.
Natural Science and Engineering Research Council (Canada) Award of Excellence 2002, for sustained excellence in research, November 2002.
Runner up for the NSERC Herzberg Gold Medal for Science. 2002.
Hebb Award, Canadian Society for Brain, Behaviour, and Cognitive Science (CSBBCS), January 2003.
<https://www.csbbcs.org/awards/distinguished-contribution/24-awards-main/hebb/34-hebb-award-200>

Present Position:

Professor Emeritus, Department of Psychology, Biology and Physiology Queens University, Kingston, Ontario Canada.

Professor of Biological Sciences, (Concurrent), Zhejiang University, P.R. China.

Honorary Research Professor, Institute of Biophysics, Chinese Academy of Sciences, Beijing.

Teaching Experience:

Tutor, Department of Psychology, University of Canterbury, 1961.

Teaching Fellow in Psychology and Visiting Lecturer in Perception, University of Sydney, Australia, 1962 - August, 1964.

Laboratory Instructor in Perception, Psychology Department, Dalhousie University, 1964-65 and 1966-67.

Lecturer in Neurobiology (Part-time), Department of Physiology-Anatomy University of California, Berkeley, 1968-69.

Assistant (1969), -Associate (1974), -Full Professor (1978) of Psychology, Department of Psychology, Queen's University, Kingston, 1969-2005, Tenure 1971.

Cross appointed Professor in Physiology, and Biology, Queen's University, 1978-2005.

Adjunct Professor of Mechanical and Industrial Engineering, University of Toronto, 2004-2006.

Courses taught include: Introduction to Psychology, Perception, Physiological Psychology, Advanced Perception, Comparative Sensory Systems, Brain and Behaviour, Graduate Courses in Vision, Audition, and Neuroethology. Numerous B.A. (Hons.), M.A. and Ph.D. Theses and P.D.F.s supervised.

Research Experience:

- (1) Masters research supervised by Dr. John Nash, University of Sydney, 1962-63, "Subliminal perception and partial information".
- (2) Research assistant to Dr. W.K. Honig, Dalhousie University, 1965-66; After-effects of seen movement.
- (3) Supervised by Dr. M. Segal, Department of Pharmacology, Dalhousie University, worked on the relationship between electrically and chemically produced seizures in the cat brain.
- (4) Ph.D. Thesis research supervised by Dr. W.K. Honig, with Dr. Lorrin Riggs, Brown University also acting as an advisor: The effect of light and dark adaptation on the a, b, and d waves of the flicker electroretinogram.
- (5) While Assistant Research Physiologist in the Department of Physiology-Anatomy, University of California, Berkeley, (Dr. G. Westheimer, F.R.S., Post-Doctoral Fellow supervisor) carried out research on rod-cone interaction in the human visual system, single cell activity in the retina and tectum of amphibia, and described eye movements of Daphnia.
- (6) Research conducted at Queen's University includes continuing single cell recording studies of the optic tectum, nucleus rotundus and Wulst of pigeons, kestrels, owls, etc., and the auditory system of pigeons and saw-whet owls. This work was supported by the Natural Sciences and Engineering Research Council of Canada for 45 years

- (7) In the lab of Professor P.O. Bishop, F.R.S., Department of Physiology, John Curtin School for Medical Research, Australian National University, worked with J. Nelson on a study of orientation specific inhibition originating from beyond the classical receptive field in cat visual cortex. (This work was one of the first to examine how the context provided by surrounding areas of visual space influences the firing rate of orientation specific neurons.)
- (8) Supported by the Medical Research Council of Canada research was carried out on the accessory optic system and the visual control of posture and balance. Single unit, ¹⁴C-2- Deoxyglucose autoradiographic, neuroanatomical, and head and postural movement studies were included in this programme. (The work from our lab showed how visual flow fields at the single neuron level are decomposed into the 6 parameters of 3 space required to control the trajectory of any object or animal, and that all these visual neurons are organized in the same orientation axes as the vestibular system,)
- (9) In the lab of Professor J.D. Pettigrew, F.R.S., National Vision Research Institute, University of Melbourne, worked on processing in the Visual Wulst, and nucleus rotundus of pigeons.
- (10) Supported by National Health and Welfare Canada we developed a vibrotactile vocoder (artificial ear) for the profoundly deaf. This device picks up sounds and, after electronic processing, presents them to a linear array of vibrators on the skin, thus creating a "tactile cochlea".. Extensive evaluation has demonstrated its utility for (1) recognizing environmental sounds, (2) recognizing spoken words, (3) as a complement to lip-reading, which dramatically increases understanding of continuous speech, and (4) as a device to aid speech production by the feedback it provides.
- (11) Supported by a National Centre of Excellence Grant to the Institute for Robotics & Intelligent Systems we carried out research on "Helmet Mounted displays and Interactive Virtual Realities for Telerobotic Application."
- (12) Other research has included studies of visual unlocking of Parkinsonian akinesia, averaged evoked potential studies of visual processing in man, and studies of hypnogenic areas in the brains of cat and rat.
- (13) Supported by the "TeleLearning" Provincial Centre of Excellence, we investigated the comparative learning advantages of various completely immersive and interactive Virtual Visual and Auditory Realities. These involved interaction in large space where students explored by walking (on a treadmill) or bicycling around a 1 km square virtual space to explore objects that promote conceptual understanding, as well as a virtual room in which all sorts of small virtual simulators can be built.
- (14) A new research initiative on "Neuroethology of social bonding and recognition in Pigeons" was initiated in 1996. Miniature radio telemetry units radioed out signals from individual neurons in brain structures believed to process social images of conspecifics. Already, several completed studies show pigeons readily respond to dynamic video sequences of other birds and critical triggering features are now being identified.

(15) An international collaborative venture to study the navigational behaviour of Sooty Shearwaters and the underlying neural mechanisms was undertaken in New Zealand. This work included (1) first mapping in detail, using the Argos satellite tracking system, the incredible 50,000 Km yearly journey of the Sooty Shearwater, (2) seeing whether or not waved albatross from the Galapagos Island of Espanola uses the earth's magnetic fields to aid their navigation to Peru and back, by using Co-netic (Mu metal) magnetic foil shields and small Neodymium-Iron-Boron magnets attached to their heads, (3) attempting to elucidate the brain mechanisms involved in processing navigationally relevant information from various sources, such as the sun-compass, optic flow fields, vestibular information and possibly visual and olfactory landmarks, and discover how this is used to guide avian navigational behaviour. (4) developed a miniature GPS tracking system and data-logger that is small and light-weight enough to be worn by homing pigeons and will be used in many subsequent navigation studies.

(15) Navigational Behaviour of the Monarch Butterfly. We have recently initiated a new program where we have built a flight simulator for Monarchs in which they fly while tethered for up to four hours. Our Virtual Reality setup allows us to precisely monitor their direction and activity so we can reconstruct the detailed intricacies of their flight path. Computer-controlled Helmholtz coils and various other systems allows us to study their long-distance migration in the lab while investigating sun compass, magnetic field sensitivity, and orientation to the e-vector of polarized light.

(16) A new collaboration is being undertaken with Prof. Eric Warrant, of Lund University in Sweden on the migratory behaviour of the Bogong moth and is supported by a grant from the US Airforce Office of Scientific Research. Since these moths migrate at night we are anticipated they may use either stellar information, or the earth's magnetic fields to guide them to their aestivation sites in caves in the Snowy Mountains of Australia. A new flight simulator has been developed specifically for these studies, that produces optic flow of images of the ground over which they pass, and always moves these images backward in their visual field no matter which direction they choose to fly in. Results show late spring migratory paths are clearly oriented in a southerly direction and early autumnal paths of moths captured in the Snowy Mountains are all oriented in northerly directions. The most recent experiments show that even on completely overcast nights the bogongs recently emerged from their summer aestivation in the alpine granite caves still fly in significantly northerly directions strongly implicating magnetic orientation. Moreover manipulation the orientation of earth strength magnetic fields, by 3 pairs of Helmholtz coils, in very recent experiments show the Bogong moths migratory orientation is determined by magnetic information.

Administrative Experience:

Chairman, Christchurch Teachers College Council, 1958.

Department of Psychology Administration: Undergraduate Committee, Animal Care Committee, Chairman Honours Thesis Committee, Procedures Committee, Academic Advisor Life Sciences Advisor, Graduate Admissions Committee, Chairman Graduate Studies and Graduate Steering Committee, Departmental Faculty Evaluation Committee, Appointments and Tenure Review Committee; Chairman, Support Services Committee; Chairman, Basic and Applied Psychology Program; Merit committee, Support Services Reorganization Committee, Chairman; Various Search Committees; Colloquium Committee Faculty Advisor, Animal Care Officer, Chairman Space and Support Services Committee; Chairman, Brain, Behaviour and Cognitive Science Programme, Ethics Policy Review Committee.

University Administration: Senator 1972-75, University Council, Residences Board, Senate Nominating Committee, Grievance Filter Tribunal, Psychology Headship Committee (1972), Life Sciences Program Counsellor, Advisory Committee for Graduate School Deanship, Graduate School Council, Steering Committee Graduate School Council, Advisory Research Committee (Subcommittee Life Sciences), Psychology Department Headship Advisory Committee (1981), Bank of Montreal Chair Committee, Chairman, Subcommittee I, Advisory Research Committee, School of Graduate Studies and Research. Graduate Council; University Animal Care Committee, Associate Deanship Selection Committee, Physiology Department Headship Committee, Psychology Department Headship Committee (1998), Task force on Animal Care (2000).

Reviewing Referee: Editor, 'Journal of Comparative Physiology (A)'. Editorial Board " Visual Neuroscience", Editorial Board "Canadian Journal of Psychology. Regularly reviews for 'Journal of Neuroscience', 'Vision Research', 'Physiology and Behaviour', 'Canadian Journal of Psychology', 'Science', 'Nature', 'Journal of Comparative Physiology', 'Experimental Brain Research', 'Brain Research', 'Journal of Experimental Biology, Visual Neuroscience', Current Biology, Trends in Neuroscience etc. National Research Council and Medical Research Council of Canada Research Grant Applications. NSERC Psychology Grant Selection Committee 1979-82, Ontario Graduate Scholarship Committee. Grant reviewer for U.S. Office of Naval Research, B.C., Ministry of Health, U.S. National Science Foundation. Human Frontiers Science Program. Marsden Fund, Royal Society of New Zealand. CRESTECH, Ontario Centre of Excellence. Israeli Science Foundation

United States National Academy of Science, Working Group on Research Directions for Development of Tactile Aids for the Deaf.

Group Chairman, Life Sciences, Natural Sciences and Engineering Research Council, 1983-1985. E.R.W. Steacie Memorial Fellowship Selection Committee; Committee on Grants and Scholarships, NSERC, 1983-85. Ex Officio Member Advisory Committee for Life Sciences. Tri-Council Advisory Committee (NSERC, SSHRC, MRC), etc. Consultant to NSERC on Human Frontiers Science Programme. Chairman, NSERC Industrial Chair Evaluation Committee, 1992, 1997.

Research Council Member, and member of executive committee of the Canadian Institute for Advanced Research, 1986 to 1998.

Member, Task force for establishing the Human Development Program of the Canadian Institute for Advanced Research.

Chairman, Advisory Committee on Artificial Intelligence and Robotics, CIAR, 1987-1994, Member Executive Committee of Council, Task force for Programme in Human Development. IPACs Coordinating Committee, 1990-1994.

Medical Research Council of Canada, Member Scientific Programme Selection Committee, 1988; Chairman, Site Visit Committee for MRC Programme Grant, 1994.

Member, NSERC Collaborative Grants Selection Panel A (Life Sciences), 1994-1995.

Member of NASA/NIH study section for 1997 International Space Neurolab Flight.

Member, Research Committee, Institute for Robotics and Intelligent Systems (IRIS), National Centre of Excellence, 1989-1994, 1999-2003

Member, College of Reviewers, Canada Research Chairs.

Member, Canadian Institute for Advanced Research Task Force for establishing an “Experience Based Brain Development” program.

Member, Canadian Institute for Advanced Research Task Force for establishing a program of Neural Networks and Machine Learning.

Chairman Advisory Committee, Canadian Institute for Advanced Research program on Neural Computation and Adaptive Perception 2003-2008

Member of NSERC’s Herzberg Gold Medal for Science Selection Committee, 2008, 2009.

Member of NSERC’s Brockhouse Prize Committee, 2008, 2009.

Industrial Contributions:

Chairman of Advisory Committee, CIAR's Artificial Intelligence and Robotics Programme, 1987-1994.

Member of IPAC's Coordinating Committee, a committee to coordinate activities of PRECARN's Industry/University High Tech Precompetitive Applied Research Network, IRIS's National Centre of Excellence Institute for Robotics and Intelligent Systems, and the AIR Programme of CIAR.

Queen's University Tactile Vocoder. Our team designed, built and tested many prototypes of this aid for the deaf, including VLSI chips through CMC. A derivative system is now manufactured by Audiologic Engineering Inc. in the USA.

Member of the Research Management Committee for IRIS.

Several former students and associates work in Canadian High Technology Industries including:

- (1) Dr. Patricia Brooks, Senior Function Manager, Corporate Design Group of Bell Northern Research.
- (2) Mr. David Gibson, Advisor, Organizational Effectiveness, Nortel Group, Ottawa.
- (3) Mr. Robert van Veen, Hardware Product Designer, Bell Northern Research.
- (4) Mr. Jonathon Spratley, Manager, Research and Development, Newbridge Corporation, Ottawa.
- (5) Mr. Frank Huntley, President, Timberlake Software Inc. This company produces and markets software for handling Medical Records and Billing, and related customized user-friendly software.
- (6) Dr. Peter Ramm, President and Director of Research and Development of Imaging Research Inc., St. Catharines, Ontario. The imaging software for microdensitometry of the brain was developed in my lab and has been very successfully commercialized by Dr. Ramm and his Company. IR now produces Imaging Technology for all areas of Biological Science, Industrial Biotechnology and Biomolecular Screening. Software and hardware systems are exported around the world. This company employed 25, and was eventually acquired by General Electric.

Publications:

- Frost, B.J. Subjective colors: an objective color artifact. Journal of Psychology, 1965, 60, 251-254.
- Jacobson, J.Z., Frost, B.J., King, W.L. A case of dermo-optical perception. Perception and Motor Skills, 1966, 22, 515-530.
- Frost, B.J. Centrifugal control of avian retinal sensitivity. Royal Society Research Reports, 1966, 57-58.
- Frost, B.J. The effect of light adaptation on the pigeon ERG. Royal Society Research Reports, 1967, 45-51.
- Frost, B.J. Post-inhibitory rebound of the b-waves of the pigeon ERG. Experientia, 1969, 25, 260-261.
- Frost, B.J. The effect of light adaptation on the d-wave of the pigeon ERG. Physiology and Behaviour, 1972, 8, 829-835.
- Annis, R.C. and Frost, B.J. Human visual ecology and orientation anisotropies in acuity. Science, 1973, 182, 729-731.
- Frost, B.J. and Richardson, B.L. A sound localization device for the deaf. Proceedings of the Conference on Engineering Devices in Rehabilitation, 1974, 1, 143-146.
- Frost, B.J. Eye movements in *Daphnia pulex* (de Geer), Journal of Experimental Biology, 1975, 62, 175-187.
- Frost, B. J. and Kaminer, J. J. The orientation anisotropy and orientation constancy: A visual evoked potential study. Perception, 1975, 4, 51-58.
- Frost, B.J. and Richardson, B.L. Tactile localization of sounds: Acuity, tracking moving sources, and selective attention. Journal of the Acoustical Society of America, 1976, 59, 907-914.
- Frost, B.J. and DiFranco, D.E. Motion specific units in the pigeon's optic tectum. Vision Research, 1976, 1229-1234.
- Wood, E.J. and Frost, B.J. Adaptation and habituation characteristics of tectal neurons in the pigeon. Experimental Brain Research, 1977, 27, 347-354.
- Richardson, B.L. and Frost, B.J. Sensory substitution and the design of an artificial ear. Journal of Psychology, 1977, 96, 259-285.
- Nelson, J.I. and Frost, B.J. Orientation-selective inhibition from beyond the classical visual receptive field. Brain Research, 1978, 139, 357-365.
- Frost, B.J. The optokinetic basis of headbobbing in the pigeon. Journal of Experimental Biology, 1978, 74, 187-195.
- Frost, B.J. Moving background patterns alter directionally specific responses of pigeon tectal neurons. Brain Research, 1978, 151, 599-603.

- Wong, S.C.P. and Frost, B.J. Apparent subjective acceleration and motion induced by movement of the observer's entire visual field. Perception and Psychophysics, 1978, 24(2), 115-120.
- Richardson, B.L. and Frost, B.J. Tactile localization of the direction and distance of sounds. Perception and Psychophysics, 1979, 25(4), 336-344.
- Frost, B.J., Scilley, P.L. and Wong, S.C.P. Moving background patterns reveal double opponency of directionally specific pigeon tectal neurons. Experimental Brain Research, 1981, 43, 173-185.
- Scilley, P.L. and Frost, B.J. Evaluation of an auditory prosthetic device for the profoundly deaf. Journal of the Acoustical Society of America, 1981, 69, 8123.
- Morgan, B. and Frost, B.J. Visual response characteristics of neurons in nucleus of basal optic root in pigeons. Experimental Brain Research, 1981, 42, 181-188.
- Wong, S.C.P. and Frost, B.J. The effect of visual-vestibular conflict on the latency of steady-state visually induced subjective rotation. Perception and Psychophysics, 1981, 30(3), 228-236.
- Frost, B.J. New aid: insights for the hearing-impaired. Behavior Today, Dec. 1981.
- Mason, J.L., Scilley, P.L. and Frost, B.J. A vibrotactile auditory prosthetic device. International Electrical Electronics Conference Digest 1981, 104-106.
- Frost, B.J., Morgan, B. and Nakayama, K. Single tectal cells sensitive to differential motion independent of direction. Paper presented to Assoc. for Research in Vision and Ophthal, May 1982. Investigative Ophthal & Vis. Science, 1982, 22, 12.
- Frost, B.J. Behavioural and physiological mechanisms for distinguishing between object motion and self-induced visual motion in the pigeon. Chapter in Advances in the Analysis of Visual Behaviour, Eds., D. Ingle, M. Goodale and R. Mansfield. M.I.T. Press, 1982.
- von Grunau, M. and Frost, B.J. Double-opponent-process mechanisms underlying RF-structure of directionally specific cells of cat lateral suprasylvian visual area. Experimental Brain Research, 1983, 49, 84-92.
- Frost, B.J. and Nakayama, K. Single visual neurons code opposing motion independent of direction. Science, 1983, 220, 744-745.
- Brooks, P.L. and Frost, B.J. Evaluation of a Tactile Vocoder Device for word recognition. Journal of the Acoustical Society of America, 1983, 74, 34-40.
- Ramm, P. and Frost, B.J. Regional metabolic activity in rat brain during sleep/wake activity. Sleep, 1983, 6, 196-216.
- Brooks, P.L., Frost, B.J., Mason, J.L. and Chung, K. Evaluation of running speech on a vibrotactile vocoder, Tactile Communications Conference Proceedings, Institute of Logopedics, 1983.
- Frost, B.J. NAS-NRC Report: Basic and applied research on tactile aids for the deaf. Report of Working Group 90 for the Committee on Hearing, Bioacoustics and Biomechanics. National Academy of Sciences - National Research Council (U.S.A.), 1983.

- Ramm, P., Stryker, M.P., Kulick, J.H. and Frost, B.J. Video and scanning microdensitometer-based imaging systems in autoradiographic densitometry. Journal of Neuroscience Methods, 1984, 11, 89-100.
- Emerson, V. F. and Frost, B. J. Experimental field trials of the Bryenton Sonar Aid for the blind, Auditory Prosthetics Reports, 1984, 1-9
- Ramm, P., Beninger, R.J. and Frost, B.J. Functional activity in the lateral habenular and dorsal raphe nuclei following administration of several dopamine antagonists. Canadian Journal of Physiology and Pharmacology, 1984, 62, 1530-1533.
- Mason, J.L., Gibson, D.M., Frost, B.J. and Brooks, P.L. A custom integrated circuit implementation of a tactile vocoder. Proceedings Intl. Conf. Rehab. Eng., 1984, 2, 291-292.
- Brooks, P.L., Frost, B.J. and Mason, J.L. Understanding speech through the skin. Proceedings Intl. Conference Rehab. Eng, 1984, 2, 570-571.
- Frost, B.J. Neural mechanisms for detecting object motion and figure-ground boundaries, contrasted with self-motion detecting systems. Chapter in: Brain Mechanisms of Spatial-vision, Eds. D. Ingle, M. Jeannerod and D. Lee, Nijhoft, Netherlands, 1985.
- Brooks, P.L., Frost, B.J., Mason, J.L. and Chung, K. Identification of 250 words using a tactile vocoder. Journal of the Acoustical Society of America, 1985, 77, 1576-1579.
- Thompson, W.R., Cuddy, L. and Frost, B.J. Opponent processes in vowel perception. Canadian Journal of Psychology, 1985, 39, 1-15.
- Brooks, P.L., Frost, B.J., Mason J.L. and Gibson, D.M. Continuing evaluation of the Queen's University Tactile Vocoder: I Identification of open-set words. Journal of Rehabilitation Engineering, 1985, 22, 119-128.
- Brooks, P.L., Frost, B.J., Mason, J.L. and Gibson, D.M. Continuing evaluation of the Queen's University Tactile Vocoder: II Identification of open set sentences and tracking. Journal of Rehabilitation Engineering, 1985, 22, 129-138.
- Nelson, J.I. and Frost, B.J. Intracortical inhibition among co-axially aligned simple cells in cat striate cortex. Experimental Brain Research, 1985, 61, 54-61.
- Pettigrew, J.D. and Frost, B.J. A tactile fovea in the Scolopacidae. Brain Behavior and Evolution, 1985, 26, 185-195.
- Ramm, P. and Frost, B.J. Cerebral and local cerebral metabolism in the cat during slow wave and REM sleep. Brain Research, 1986, 365, 112-124.
- Brooks, P.L., Frost, B.J., Mason, J.L. and Gibson, D.M. Acquisition of a 50 word vocabulary and identification of voicing and manner of articulation cues by the profoundly deaf using the Queen's University Tactile Vocoder. Journal of Speech and Hearing Research, 1987, 30, 137-141.
- Brooks, P.L. and Frost, B.J. The development and evaluation of a Tactile Vocoder for the profoundly deaf. Canadian Journal of Public Health, 1986, 77, 108-113.

- Frost, B.J., Cavanagh, P. and Morgan, B. Deep tectal cells in pigeons respond to kinematograms. Journal of Comparative Physiology. 1988, 162, 639-647.
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- Telford, L. and Frost, B.J. Functional activity in accessory optic system during optokinetic, vestibular and visual-vestibular stimulation in the pigeon. Experimental Brain Research, 1989, 77, 391-398.
- Frost, B.J., Wylie, D.R. and Wang, Y-C. The processing of object and self-motion in tectofugal and accessory optic pathways of birds. Vision Research, 1990, 30, 1677-1688.
- Frost, B.J., Wise, L.Z., Morgan, B. and Bird, D. Retinotopic representation of the bifoveate eye of the kestrel, *Falco sparverius*, on the optic tectum. Visual Neuroscience, 1990, 5, 231-239.
- Wylie, D.R. and Frost, B.J. The visual response properties of neurons in the nucleus of the basal optic root of the pigeon: a quantitative analysis. Experimental Brain Research. 1990, 82, 327-336.
- Shimizu, Y. and Frost, B.J. Effect of orientation on visual and vibrotactile letter recognition. Perception and Motor Skills, 1990, 71, 195-198.
- Wylie, D.R. and Frost, B.J. Binocular neurons in the nucleus of the basal optic root (nBOR) of the pigeon are selective for either translational or rotational visual flow. Visual Neuroscience, 1990, 5, 489-495.
- Wylie, D.R. and Frost, B.J. Purkinje cells in the vestibulocerebellum of the pigeon respond best to either translational or rotational wholefield visual motion. Experimental Brain Research, 1991, 86, 229-232.
- Wang, Y. and Frost, B.J. Visual response characteristics of neurons in the nucleus isthmi magnocellularis and nucleus isthmi parvocellularis of pigeons. Experimental Brain Research, 1991, 87, 624-633.
- Jiang, S., Wang, Y. and Frost, B.J. Visual response properties of nucleus rotundus cells of the thalamus in the pigeon. Journal of Guangxi Normal University, 1991, 9, 60-66.
- Mason, J.M. and Frost, B.J. Signal processing strategies for multi-channel systems. In: I. Summers (Ed.) Tactile Aids for the Hearing Impaired, Whurr, London, 1992.
- Wang, Y. and Frost, B.J. "Time to collision" is signalled by neurons in the nucleus rotundus of pigeons. Nature, 1992, 356, 236-238. (Written up in Current Biology, 1992, 2, 371-372).
- Telford, L., Spratley, J. and Frost, B.J. The role of kinetic depth cues in the production of linear vection in the central visual field. Perception, 1992, 21, 337-349.
- Shaver, S.W., Telford, L. and Frost, B.J. The roles of visual field locus, display size and direction and relative depth cues in linear vection. Investigative Ophthalmology and Visual Science, 1992, 33, 1145.
- Wang, Y., Jiang, S. and Frost, B.J. Visual processing in pigeon nucleus rotundus: luminance, colour, motion and looming subdivisions. Visual Neuroscience, 1993, 10, 21-31.

- Frost, B.J. Subcortical Analysis of visual motion: Relative motion, figure-ground discrimination and self-induced optic flow. In F.A. Miles, and J. Wallman (Eds.). Visual Motion and its role in the Stabilisation of Gaze. Elsevier, Amsterdam, 1993, 159-175.
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- Wang, Y.-C, Jiang, S. and Frost, B.J. Functional subdivisions in the pigeon's thalamus nucleus rotundus. Journal of Guangxi Normal University, 1993, 11, 62-68.
- Wylie, D.R., Kripulani, T. and Frost, B.J. Complex spike activity of Purkinje cells in the pigeon vestibulocerebellum in response to optokinetic stimulation: I. Function organization and quantitative analysis of neurons discriminating between translational and rotational visual flow. Journal of Neurophysiology, 1993, 70, 2632-2646.
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- Frost, B.J., Wylie, D.R. and Wang, Y.C. The analysis of motion in the visual systems of birds. In: P. Green and M. Davies (Eds.). Perception and Motor Control in Birds. Springer-Verlag, Berlin, 1994, 248-269.
- Wylie, D.R., Shaver, S.W. and Frost, B.J. The visual response properties of neurons in the nucleus of the basal optic root of the Northern Saw-Whet Owl (*Aegolius acadicus*). Brain, Behaviour and Evolution, 1994, 43, 15-25.
- Wagner, H. and Frost, B.J. Binocular responses of neurons in the Barn Owl's visual Wulst. Journal of Comparative Physiology, 1994, 174, 661-670.
- Wang, S.R., Wang, Y.-C. and Frost, B.J. Differential modulation of visual activity in the pigeon optic tectum by magnocellular and parvocellular components of the nucleus isthmi. Experimental Brain Research, 1995, 104, 376-384.
- Gao, H.-F., Wu, G.-Y., Frost, B.J. and Wang, S.-R. Excitatory and inhibitory neurotransmitters in the nucleus rotundus of pigeons. Visual Neuroscience, 1995, 12, 819-825.
- Frost, B.J. Strategies for facilitating the development of scientists and scholars: A personal view. University of Montreal. In: Compte rendu: Évolution et impact sur la formation de la relève et le financement étudiant. Université de Montréal, Québec. July 1995, pp. 7-21.
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- Frost, B.J. Invited Address. Neural mechanisms specialized for higher order motion detection. 5th International Congress of Neuroethology, 1998.
- Frost, B.J. Neural sculpting by the early social environment. Workshop in "Biological Factors Affecting Health in the Workplace." CIAR, 1999.
- Frost, B.J. New directions for Human Machine-Interface Research. IRIS, 1999.
- Frost, B.J. State of the Art Invited Address for Sensory Physiology. International Congress of Psychology, Stockholm, Sweden, 2000.
- Sun, H.J. and Frost, B.J. Neuronal Models of Looming Detectors. Fourth International Conference on Cognitive and Neural Systems, Boston, Mass., 2000.
- Frost, B.J. Neural selectivity for different classes of complex visual motion. Banff Annual Seminar in Cognitive Science. May 19-21, 2000.
- David, S.E., Frost, B.J. and McLaughlin, S. Aviary housing for pigeons in an animal facility. CALAS, 2000.
- Poirier, F.J.A.M. and Frost, B.J. Integration mechanisms revealed by orientation adaptation. Association for Research in Vision and Ophthalmology Abstracts, 2001.
- van der Willigen, R.F., B.J. Frost and Wagner, H. Depth generalization from stereo to motion parallax in the owl. 6th International Congress of Neuroethology, 2001.
- Sun, H. and Frost, B. J. Detection of impending collision with a looming object: Neuronal responses and models. 3rd International Conference on Cognitive Science (ICCS), Beijing, 2001.
- Sun, H. and Frost, B. J. Visual control of target-directed locomotion in a virtual environment. The 3rd International Conference on Cognitive Science (ICCS), Beijing, 2001.
- Sun, H. and Frost, B. J. Neuronal responses to looming objects in pigeon nucleus rotundus neurons. 23rd International Ornithological Congress, Beijing, 2002.
- Poirier, F.J.A.M., & Frost, B.J. (2002). Contour integration across attributes occurs in parallel, within attribute maps. 2nd Vision Sciences Society, 2002.
- Poirier, F.J.A.M., & Frost, B.J. (2003). A parallel binding solution via separate integration and segregation mechanisms. 3rd Vision Sciences Society, 2003.

Frost, B.J. Virtual Reality Test-beds for Animal and Human Research. Invited talk to National Centre of Excellence Research Conference, Institute for Robotics and Intelligent Systems, Ottawa, June 2003.

Frost, B.J. Wonders of Migration: Experiments with the monarch butterfly. Invited talk to Retiree Association, Queen's University, Kingston, November 2003.

Frost, B.J. The sensory world of experimental animals. Invited address to CALAS, Quebec City, Quebec, 23 June 2003. (NSERC)

Frost, B.J. Neural mechanisms for processing different types of visual motion. Donald O. Hebb Award Talk, CSBBCS, McMaster University, Hamilton, 13 June 2003. (NSERC)

Frost, B.J. Neural mechanisms for computation of "Time to Collision." Invited talk to Regan Festschrift, York University, Toronto, June 2003. (NSERC)

Frost, B.J. Migration: How birds and insects find their way. Invited talk to Nayland College, Nelson, NZ, 2004.

Li, Z., Milgram, P., Frost, B. (2004) "Manipulation of perception of time-to-collision with leading vehicle in a driving simulator" (Demo), 14th Annual Canadian Conference on Intelligent Systems. Ottawa, Ontario.

Li Z., Milgram, P., Frost, B. (2004) "Braking behaviour during car following in a driving simulator: Effect of Tau manipulation on perception of time-to-collision" (Poster), 14th Annual Canadian Conference on Intelligent Systems. Ottawa, Ontario.

Frost, B.J., **Mukhida, M., Stalleicken, J. & Mouritsen, H.** How do Monarch's (*Danaus plexippus*) navigate to Mexico. Poster presented to New Zealand Monarch Butterfly Trust Conference, Auckland, November 2005

Frost, B.J. Bird & Butterfly Migration. Invited talk to Canadian Museum of Nature, Ottawa, May 2005.

Frost, B.J. Flight Simulator studies of monarch butterfly migration: Cues used to determine migratory orientation. Invited Colloquium to School of Biological Sciences, Australia National University, Canberra, Australia, April 2005.

Frost, B.J. Neural mechanisms for detecting different classes of visual motion. Invited Colloquium to School of Biological Sciences, Australia National University, Canberra, Australia, April 2005.

Frost, B.J. Migration of Birds, Butterflies and Other Animals. Invited address to Rideau Valley Field Naturalists, Perth, Ont., January 2005.

Frost, B.J. Scientific Research over 4 decades, 4 continents and many species. Invited talk to Distinguished Lecture Series, Queen's University, 2005

Frost, B.J. Recent Experiments on Bird & Butterfly Migration. Invited lecture to Kingston Field Naturalists, January 2005.

Frost, B.J. Monarch Butterfly Migration. Poster presented to Christchurch Museum, Christchurch, New Zealand, 2006.

Frost, B.J. Tiny Brains but Powerful Computers: Lessons from the birds and bees. Invited talk to "The Saturday Club", Kingston, November 2006.

Garlick, K., & Frost, B.J. Visual & Olfactory Cues used by Monarch Butterflies (*D. Plexippus*) to locate their host plant. Poster presented to Centre for Neuroscience Research Conference, Queen's University, October 2006

Stalleicken, J., Mouritsen, H., Frost, B., Mukhida, M., "Compass orientation and spatiotemporal orientation strategies in monarch butterflies (*Danaus plexippus*)". Comparative Biochemistry and Physiology, 2006

Frost, B.J. Information used by birds and butterflies to navigate during migration. Invited talk to Biological Field Station Research Seminar Series, Queen's University, July 2006.

Frost, B.J. Flight Simulator Studies of Monarch Butterfly Migration. Invited keynote address to Perception and Action Conference, Winnipeg, April 2006.

Frost, B.J. Behavioural and Perceptual Neuroscience: Around the world in 40 years. Invited keynote address to Prairie Honours Conference, Winnipeg, April 2006.

Frost, B.J. Monarch Butterfly Migration. Six talks given to Grades 1-6, Appleby School, Nelson, NZ, March 2006.

Frost, B.J. How monarchs find their way from Canada to Mexico. Invited talk to New Zealand Forest and Bird Society, Nelson, New Zealand, March 2006.

Frost, B.J. To be ... or not to be ... Heard. Invited talk. Audition Seminar, Queen's University, Jan 2007.

Frost, B.J. Advice to young researchers. Invited talk to Graduate Student Research Day, Dept. of Psychology, Queen's University, May 2007.

Frost, B.J. Vision for navigation and way-finding in birds or butterflies. Plenary address to Vision Down Under Conference, Palm Cove, Queensland, Australia, 19-22 July 2007.

Garlick, K., & Frost, B.J. Visual & Olfactory Cues used by Monarch Butterflies (*D. Plexippus*) to locate their host plant. Poster presented to International Congress of Neuroethology, Vancouver, B.C., July 2007.

McNeil, J., & Frost, B.J. Heading for Home: A testable hypothesis of how monarch butterflies find over-wintering sites in Mexico. Paper presented to Canadian Entomological Society of Canada, Ottawa, 19-22 October 2008.

McNeil, J., & Frost, B.J. Heading for Home: A testable hypothesis of how monarch butterflies find overwintering sites in Mexico. Paper presented to The International Society of Chemical Ecology, Penn State University, 19-22 August 2008.

Frost, B.J., **Stalleicken, J., Mukhida, M. & Mouritsen, H.** Monarch Butterfly (*Danaus plexippus*) migration: A multi-stage, multi-model process. Paper presented to International Conference on Comparative Physiology & Biochemistry, Masai Mara, Kenya, July 2008.

Frost, B.J. Monarch butterflies. Invited talks. Crystal Springs Primary School, Victoria, B.C., April 2008.

Xiao, Q., and Frost, B.J., “Pigeon pretectal neurons are facilitated by two depth planes of translational flow simulating motion parallax.” 9th International Congress of neuroethology, Salamanca Spain, 2-7 August 2010.

Consultancies:

- Consultant and participant for 'The Humane Conspiracy', a B.B.C. Science documentary directed by Nigel Calder. Book of same title and material also.
- Consultant for CBC 'Nature of Things' documentary on the Skin.
- Consultant and participant 'Vista Science Series' "Perception: More than Meets the Eye".
- Consultant and participant, Queen's University "Opportunities: Strategic Alliances in Research and Business at Queen's University".
- Appearances on Quirks and Quarks, 1995, 1998
- Appearances on Discovery Channel
- Consultant to Science North, Sudbury, on Programme called “Brain Magic” 1997-1999
- Consultant to Ontario Science Centre on their VR displays, 1997.
- Consultant and contributor to Discovery Channel “Birds: Explore your world handbook”.

Invited Addresses and Colloquia:

Ottawa University (Department of Anatomy); Carleton University (2); Dalhousie University (3); University of California, Berkeley; University of Queensland (3); University of Canterbury; Latrobe University; Monash University; Australian National University; Neuroscience Canadian Meeting; NATO Institute for Analysis of Visual Behaviour; McGill University (2); Queen's University (several talks to Biology, Physiology, Life Sciences Group, and Psychology); York University; SUNY at Stony Brook (Anatomy & Bioscience); University of Delaware (Inst. of Neuroscience); Mount Allison University (2); Monash University; Latrobe University; University of Melbourne (2); National Vision Research Institute, University of Melbourne; Victoria Royal eye and Ear Hospital; University of Otago (2), including William Evans Open Science Lecture; University of Canterbury(2); University of Auckland (2), including one of keynote speakers at their Centennial Vision Symposium; University of Sydney(2); NATO Advanced Study Institute on Brain Mechanisms of Spatial Vision; NATO Advanced Study Institute on Function of the Superior Colliculus, Trent University (3) including T. P. S. Robertson Public Lecture; MacMaster University (Neurobiology); University of Tokyo (Institute of Zoology), NHK Research Labs, Tokyo, Industrial Products Research Institute, Tsukuba, Japan; McGill University; University of Western Ontario; California Institute of Technology, Pasadena, University of California, San Diego. Chairman, Comparative Vision Section, Ontario Vision Conference. Talk "Neural mechanisms for discriminating object motion from self motion". Ontario Vision Conference. Concordia University, Montreal. Université de Montréal, Montreal. University of California San Diego, La Jolla. Salk Institute, La Jolla. Helmholtz Club, Los Angeles. Physiology & Pharmacology Department, University of

Queensland. School of Optometry, University of New South Wales. Department of Ophthalmology, University of British Columbia. Max Planck Institute für Biologische Kybernetic, Tübingen (2). Royal Society Meeting, Kingston. McMaster University (Psychology). Harvard University(3). University of Toronto. New York University, Centre for Neural Science. PRECARN/IRIS Conference, Montreal. Keynote Address, Animal Behaviour Society, Queen's University. Terry Anders Memorial Lecture, Dalhousie University. Electrical Engineering, McGill University. Queen's University (Anatomy). IVth International Congress of Neuroethology, Cambridge, England. VIIIth International Conference on Perception and Action, Marseilles, France. Dept. Physiology, Queen's University, Abraham Festschrift, Queen's University. Dept. Physics, Queen's University. Queen's Alumni Talks in Belleville, Ontario and Dahme, Germany. Cornell University. RWTH Aachen, Germany. Dept. Biology, University of Beilefeld, Germany. Dept. Biology, Odense University. Institut für Biologische Kybernetics, Tübingen, Germany. Dept. of Psychology, University of Canterbury, NZ. Science Prestige Lecture, University of Canterbury, NZ. University of Otago, NZ (3 talks). La Trobe University, Australia. Royal Prince Alfred Hospital, Sydney. MacQuarrie University, Sydney, Australia. University of Sydney, Australia. University of Queensland, Australia.

Outreach activity:

Invited talks to several Queens Alumni Groups: Belleville, Brockville, Dahme Germany

Key Note Speaker Department of Optometry University of Auckland.

Key note Speaker, 3rd Asian Conference on Vision, Chongching, PR China.

Talk Rideau Valley Field naturalists,

Sigma Xi Ottawa, 3 talks.

Athens, Ontario, Horticultural Club, talk.

A2A (Adirondecs to Algonquin Conservation Group) , Talk to AGM.

Kingston Field Naturalists, 2 talks.

Saturday Club, Queens University, 3 talks.

Portland Horticultural Club, 2 talks. Butterfly migration and Birds and Bee Brains.

Kingston Womens Probus Club.

Monarch Butterfly Trust of New Zealand, Monarch Butterfly migration.

Nelson (NZ) Forest and Bird Society. Talk.

Science Rendezvous. Lectures on Monarch Butterfly Migration.

Museum of Nature, Talk Monarch Butterfly Migration.

Queen's University MinU. Lectures on Bird Brains and behavior and Monarch Butterfly Migration.

Schools:

Bayridge Secondary School, Kingston,. Talk to senior class on Migration in Animals

Nayland Road Secondary School, Nelson New Zealand, 2 Talks to senior Biology classes on Animal migration.

Appleby School New Zealand. Separate talks to grades 2-6 about Monarch Butterfly migration.

Crystal Springs School, Victoria, B.C. Talks to grade 2 and 3 students.

Radio Interviews:

Country Morning CBC. 2 interviews.

Quirks and Quarks. Several times.

Research Grants:

Dalhousie University Faculty of Science Research and Development Grant, 1966. To study centrifugal control of retinal sensitivity in the pigeon.

Queen's University Interim Research Grant, 1969, to study higher visual processing in man.

NRC Interim Research Grant, 1969.

NRC Operational Grant, 1970-1973, to study single cell activity in the tectum of the pigeon.

Ontario Department of University Affairs Multi-Disciplinary Research Grant for the development of artificial seeing and hearing devices, 1970. (with Dr. Neilson MacKay, Department of Electrical Engineering).

NRC Operational Grant, 1973-76, for "Studies in vision."

Canadian Council Fellowship Grant, 1975-76, to study the orientation anisotropy in Australian Aborigines of the Pintubi tribe of the Gibson Desert, NT, Australia.

Australian Institute of Aboriginal Studies, Orientation anisotropies in visual acuity in the Pintubi from Papunya.

NRC Operational Grant, 1976-79, for "Studies in vision."

Queen's University Grant, 1977-78. Experiments in Visual Physiology.

NSERC, Operational Grant, for "Studies in vision", 1979-82.

MRC, Operational Grant, for functional mapping of certain visual and hypnogenic area of the brain using C¹⁴-2-DG autoradiography and single unit recording technique, 1980-82.

Queen's University Grant, 1979-80. Evaluation of an auditory prosthetic device for the deaf.

National Health and Welfare Canada, Grant 1981-83, "The development and evaluation of a portable vibrotactile auditory prosthetic device for the profoundly deaf".

NSERC Equipment Grant, 1981, "An image analyzing/image processing system".

MRC Operating Grant, 1982-84, "CNS sites involved in the control of posture locomotion and sleep".

NSERC Operating Grant, 1982-85, "Studies in Vision".

Queen's University Grant, 1982, "The visual unlocking of Parkinsonian Akinesia".

Parkinson Foundation Grant, 1982, "The visual unlocking of Parkinsonian Akinesia. \$12,974.

NSERC Equipment Grant, 1983. "Cryostatic Microtome and Microscope for Vision Research." \$27, 907.

National Health and Welfare Canada Grant 1983-1986. "Vibrotactile Vocoders for the Deaf." \$35,000 p.a.

NSERC International Scientific Exchange Award, 1984. \$3,000.

MRC Operating Grant. 1984-87, "Visual Control of Posture and locomotion." \$38,000 p.a.

NSERC Operating Grant 1985-88. "Neural Processing of Visual Motion." \$146,249.

NSERC Equipment Grant. 1986, A Sound Synthesis and Analysis System for Auditory Physiological and Psychophysical Experiments. \$21,219.

NSERC Operating Grant, 1988-91. "Neural Processing of Dynamic Visual and Auditory Stimuli." \$150,000.

MRC Operating Grant, 1987-89. "Visual Control of Posture and Locomotion." \$76,000.

NHRDP Operating Grant, 1986-1989. "Vibrotactile Vocoders for the Deaf." \$118,000.

NSERC Equipment Grant 1989-90. Hi-speed Image Processing Computer. \$52,641.

National Centres of Excellence. Institute for Robotics and Intelligent Systems. Principal Investigator. 1990-1994. Total Inst. Grant. \$24,000,000. Frost's grant \$49,000 p.a.

NSERC Operating Grant, 1991-1994. Neural Processing of Visual and Auditory Motion and Space. \$300,000.

NSERC International Scientific Exchange Award, 1991. (Dr. Wang-Shurong). \$9,000.

NSERC Equipment Grant, 1991. Optotrak system for measuring 3D motion (with S. Lederman, R. Ellis, D. Muir, and K. Munhall). \$70,890.

NSERC International Scientific Exchange Award, 1992. (Dr. Ole Larsen). \$6,500.

MRCO, 1993-1995. "Enhanced display and control techniques for intelligent automation and manufacturing." \$150,000 p.a. With Browne, Lederman, Munhall and Glasgow. Frost's share \$18,000 p.a.

NSERC Operating Grant, 1994-1999. "Neural mechanisms for processing visual and auditory motion and space". \$465,000

National Centres of Excellence. Institute for Robotics and Intelligent Systems (Phase II). 1994-1998.
Total Inst. Grant. \$20,527,500. Frost's grant \$75,000 p.a.

National Centres of Excellence. TeleLearning Network. 1996-1999. Frost's grant \$ 27,000 p.a.

National Centres of Excellence. Institute for Robotics and Intelligent Systems (Phase III). 1998-2002.
Total Inst. Grant. \$30,000,000. Frost's grant \$33,000 p.a.

Canadian Foundation for Innovation. High Performance Computing Virtual Laboratory (with 23 others
from Queen's and others from RMC, Carleton, Ottawa and NRC). Total Inst. Grant. \$12,653,200.

NSERC Operating Grant, 1999-2004. "Neural Mechanisms of Complex Motion Analysis and
Neuroethology of Conspecific Recognition". \$498,750.

Xerox Corporation, 1999-2000. "Visual Motion Tracking and Biological Motion Models". \$15,000
(US\$).

NSERC Equipment Grant, 2000. "A High-resolution Computer for Visual and Auditory Virtual
Realities". \$43,281.

National Centres of Excellence. "Practical Applications of Advanced Mixed Reality Display and Audio
Signal Processing Concepts" Institute for Robotics and Intelligent Sensors (Phase IV). Frost's grant
\$54,600 p.a.

NSERC Award of Excellence Prize (2002), \$50,000

Canadian Foundation for Innovation, 2002-2004. A Biological Communication Research Facility.
Infrastructure project with 28 others from University of Toronto, Queen's University, and Sheridan
College. Total Institute Grant requested \$10,675,000.

National Centres of Excellence. "Practical Applications of Advanced Mixed Reality Display" Institute for
Robotics and Intelligent Systems (Phase IIIB). 2002-2005. Total Inst. Grant. \$30,000,000. Frost's
grant \$53,000 p.a.

NSERC Equipment Grant A flight simulator for birds. 2005 \$25,766

NSERC Discovery Grant 2004-2009 "Neural mechanisms of complex motion analysis and neuroethology
of complex motion perception" , \$464,000.

NSERC Discovery grant 2009-2014, Neural mechanisms of complex motion analysis and insect migration.
\$90,000.

United States Air Force Office of Scientific Research Grant 2014-2019, To Study the nocturnal migration
of the Bogong Moth *Agrotis infusa*. With E warrant S heinze and H. Mouristsen. \$1,140,000.

Students, PDFs, Technicians and Programmers Trained:

Former and Current Graduate Students:

Six Ph.D. students won Longman/McGhie Prize for best Ph.D. Thesis (Richardson, Brooks, Wylie, Shaver, Sun and Philmore). In 1997 Shelley McColl, an Honours Thesis student of mine, won the UK Chartered Institute of Building Services Engineers Walsh-Weston Medal for a paper based on her B.Sc. (Honours) Thesis. Two Former Post-Doctoral Fellows, Niko Troje and Henrik Mouritsen, won the prestigious Volkswagen, Nachwuchsgruppen Award given to the top 6-8 young scientists in Germany each year. In 200 Prof Henri Mouritsen, a former postdoctoral fellow with me won the Eric Kandel Prize for the best young European Neuroscientist under 40.

Name	Current Position
Tian P. Oei, Ph.D.	Professor and Director of Clinical Psychology, Univ. Queensland
Robert Annis, M.A.	Professor, Native Studies, Brandon University; Director of Westarc (Arctic Research Organisation)
Barry L. Richardson, Ph.D.	Dean of Arts and Science (Retired), Univ. of Papua New Guinea
Jehuda Kaminer, M.A.	Lawyer, Kingston, Ontario
Evanne Carson, Ph.D.	Research Psychologist, Dept. Ophthalmology, Univ. of Ottawa
Stephen Wong, Ph.D.	Senior Psychologist, Correctional Services of Canada
Diane Humphreys, Ph.D.	Professor of Psychology, King's College, Univ. Western
Jean Foley, M.A.	Senior Psychologist, Correctional Services of Canada
Peter Ramm, M.A./Ph.D.	Associate Professor, Department of Psychology, Brock University; President, Imaging Research Inc. Retired
Trish Brooks, M.A./Ph.D.	Senior Function Manager, Corporate Design Group, Bell Northern Research
Laura Telford, M.A./Ph.D.	CEO Organic Farmers of Canada, Ottawa.
Steven Shaver, M.A./Ph.D./M.D.	Ophthalmologist, and Head of Surgery Nanaimo B.C.
Yong-Chang Wang, M.Sc./Ph.D.	Research Associate, University of Utah
Douglas Wylie, M.A./Ph.D.,	Professor, Dept. Psychology, University of Alberta
Erin Sproule, M.A./Ph.D.	PDF, University of California San Diego, La Jolla, California.
Carmen Poulin, M.A.	Associate Professor, Dept. Psychology, Univ. of New Brunswick
Barbara Morgan, M.A.	Research Assistant (retired), Queen's University
Cam Schaeffer, M.A.	Teacher, Kingston (Ontario)
Patricia Davis, M.A. (Ph.D)	Clinical Psychologist, Kingston.
Ian McKay, M.A. (withdrew)	Teacher (deceased), New Zealand
Hongjin Sun, Ph.D.	Associate Professor, McMaster University
Thom Wright, M.A.	Business Analyst, CIBC, Toronto, Ontario

Roxanne Cosby, M.A.	Research Associate, Hamilton Regional Cancer Centre, McMaster University
Frank Huntley, M.A.	President, Timberlake Software Inc., Kingston, Ontario
Owen Paisley, B.A.	Withdrew from M.A.
Myriam Csizy, M.Sc.	Wildlife Biologist, Canadian Wildlife Service
Bill Thompson, M.A./Ph.D.	Professor, York University
Frederic Poirier, Ph.D.	PDF, Centre for Vision Research, York University
Danuta Rjaska, M.A	Ph.D. student, Dept. Psychology, Queen's University
Maya Mukhida, M.Sc.	High School Teacher, Burlington, Ontario.
Leslie Philmore, Ph.D.	Assistant Professor Dept. Psychology, Dalhousie University, Halifax, NS

Former and Current Post-Doctoral Fellows:

Name	Current Position
Michael von Grunnau, Ph.D.	Professor, Dept. Psychology, Concordia University, Principal of Science College (deceased).
Peter Ramm, Ph.D.	Associate Professor, Dept. Psychology, Brock University, CEO Imaging Research Inc, St Catharines, Ont.
Stuart Marlin, Ph.D.	Senior Lecturer, Dept. Psychology, Univ. Newcastle, Australia
Colin Ellard, Ph.D.	Professor, Dept. Psychology, University of Waterloo
Liang Li, Ph.D.	Professor, Department of Psychology, Peking University, Beijing.
Siham Nassif-Caudarella	Translator, Customer Relations, Head Start Technologies, Guelph, Ont.
Jiang, Shiyong	Professor of Biology, Guangxi University, Guilin, P.R. China
Lisa Wise, Ph.D.	Senior Lecturer, Dept. Psychology, Monash University, Australia
Henrik Mouritsen, Ph.D.,	Lichtenberg Professor, and Director of the Institute of Biology and Environmental Sciences, University of Oldenburg, Germany.
Niko Troje, Ph.D.,	Canada Research Chair and Professor of Psychology.
Qian Xiao, Ph.D.,	Researcher, Institute of Biophysics Academia Sinica, Beijing.
Partha Bhagavatuva, Ph.D.,	Post-Doctoral Fellow, Concord Field Station, Harvard University.

Technicians and Programmers:

Name	Title	Current Position
Paul Fearing, B.Sc.	Programmer	Ph.D. Student, Univ. British Columbia
Rob van Veen, B.Appl.Sci.	Engineer/Programmer	Hardware Product Design, Bell Northern Res.
Gary Powley, B.Sc.	Programmer	Systems Manager, Computing Sci, Queen's U.
Jon Spratley, B.Appl.Sci.	Engineer/Programmer	Manager, Research and Development, Newbridge Corporation, Ottawa
Chris Alfs, B. Eng.	Engineer/Programmer	Unknown
Tarun Kripalani, M.Sc.	Engineer/Programmer	Technician, Silicon Graphics, California
Jane Baldwin, B.A.	Research Assistant	Adm. Assistant, Dept. Surgery, Queen's Univ.
Barbara Morgan, M.A.	Research Assistant	Retired
Trish Brooks, Ph.D.	Research Assistant	Senior Function Manager, Corporate Design Group, Bell Northern Research
Sharon David	Research Assistant	Res. Assistant, Dept. Psychology, Queen's U.

Name	Title	Current Position
Gordon Goodchild, B.Sc.	Programmer	Programmer, Denver, Colorado
Jon Ruttan	Programmer	Unknown
Dave Gibson, M.Sc.	Electrical Engineer	Advisor, NORTEL, Ottawa
Kim Chung, M.Sc./M.D.	Electrical Engineer	Medical Practitioner, Toronto.
Jim Rodgers, Ph.D.	Computer Consulting	CIS, Queen's University, Kingston.
Chris Bethune	Programmer	NORTEL, Ottawa, Ontario.
Geoff Barrett	Programmer	Software Engineer, Novera Optics Inc., San Jose, CA.
Sarah Packowski	Programmer	MA Student, CIS, Queen's Univ., Kingston.
Shawn Leclaire	Programmer	CIS, Queen's University, Kingston.
Anna Cheviakova	Research Assistant	Res. Assistant, Dept. Psychology, Queen's U.
Frederic Poirier, M.A.	Programmer	PDF, Centre for Vision Research, York Univ.

Collaborators:

Name	Title and Institution
Ole N. Larsen	Associate Professor, Odense University, Denmark
J.D. Pettigrew, FRS	Professor and Director, Touch, Hearing and Vision Research Centre, University of Queensland, Australia
K. Nakayama	Professor of Psychology, Harvard University
P. Cavanagh	Professor of Psychology, Harvard University
Wang, Shu-Rong	Professor and Director, Institute of Biophysics, Academia Sinica, Beijing
Hermann Wagner	Professor of Biology and Animal Physiology, RWTH, Aachen, Germany
Wu, Gangyi	Research Associate, Wood's Hole Marine Station
Jiang, Shiyang	Professor of Biology, Guangxi University, Guilin, P.R. China
Harvey Karten	Professor of Neuroscience, University of California, San Diego
Martin Wild	Associate Professor of Anatomy, University of Auckland, New Zealand
Jerry Nelson	Senior Researcher, National Institute of Health, USA
Jim Mason	Associate Dean of Engineering, Queen's University
Max Cynader	Professor and Director of Brain and Spinal Cord Research Institute, University of British Columbia

M. von Grunau	Professor of Psychology, Head College of Science,, Concordia University
Yong-Tian Wang	Professor of Optics, Beijing Institute of Technology, P.R. China
Nikolaus Troje	Wolkswagen Research Fellow, Ruhr-Universität-Bochum, Germany
Henrik Mouritsen	Wolkswagen Research Fellow, University of Oldenburg, Germany
Lincoln Brower	Emeritus Distinguished Service Professor, University of Florida, USA
Jeremy McNeil	Professor of Biology, University of Western Ontario, London, Ontario
Whittko Franke	Professor of Chemistry, University of Hamburg, Germany

Professional Societies:

- Fellow, Royal Society of Canada
- Fellow, Canadian Psychological Association
- Fellow, American Association for the Advancement of Science
- Fellow, Canadian Institute for Advanced Research
- Society for Neuroscience
- Association for Research in Vision and Ophthalmology
- Alexander Graham Bell Association for the Deaf
- Visual Scientists of Ontario
- International Brain Research Organisation
- Canadian Society for Brain, Behaviour and Cognitive Science
- International Society for Neuroethology