

York Vision Group

York University, Toronto

Annual Report, June 1986 to June 1987

Faculty

- Stuart Anstis Spatio-temporal aspects of vision including visual motion. Stuart is on sabbatical leave during 1987-88.
- Michael Dawson The psychophysics and computer modelling of visual processes. Michael is moving to the University of Alberta.
- Howard Flock Achromatic brightness perception.
- Keith Grasse Electrophysiology of the visual system.
- Ian Howard Space perception, eye movements, visual-vestibular interactions.
- Peter Kaiser Colour vision. Peter is on the Board of the Lighting Research Institute and the Executive Committee of the Commission Internationale d'Eclairage.
- Hiroshi Ono The visual perception of direction and distance, eye movements. Hiroshi is on sabbatical 1987-88 and will be two months in Japan as a guest of the Japanese Government. He won the Faculty of Arts Outstanding Teaching Award for 1986.
- David Regan Visual evoked potentials. Visual and auditory disorders. Psychophysics of visual motion, stereopsis and colour vision. Auditory psychophysics. Vision in aviation.
- Paul Stager Human factors in aerospace performance, visual search. Paul has been reappointed Canadian representative to the Council of the International Ergonomics Association.

Martin Steinbach Eye movements, visual-motor coordination. Martin has a Research Fellowship in 1987-88.

Research Associates

Esther Gonzalez Working with Ono and Steinbach on visual development in one-eyed children. Congratulations on the arrival of baby Alexandra.

Bonnie Moidell Working with Steinbach and Ono on egocentric localization in one-eyed children.

Masao Ohmi Working with Howard on the oculomotor system and visual-vestibular interactions.

Marian Regan Starts a Research appointment in September to work on time-series analysis of evoked potentials.

Ram Vimal Working with Kaiser on colour vision.

Post Doctoral Fellows

Karin Arnold Karin arrives in September to work with Anstis on colour vision in animals.

Linda Bowns Linda arrived in March from studying with O. Braddick in Cambridge, England. She will be working with Ono on the psychophysics of space perception.

Bill Simpson Bill arrived in April from studying with J. Kennedy at the University of Toronto. He will be working with Howard on mechanism of spatial orientation.

Graduate students (supervisors)

Richard Bird (Howard)	Richard had his NSERC Scholarship renewed.
Bob Cheung (Howard)	
Debbie Giaschi (Anstis)	Debbie won the O.P.A. prize for her M.A. thesis, a Province of Ontario Graduate Scholarship and an ARVO travel grant.
Hameluck, D. (Stager)	
Haruo Hibino (Kaiser)	Hauro won a Government of Canada Scholarship.
Lynne Kirshner (Steinbach)	
Alistair Mapp (Ono)	
Chieko Murasugi (Howard)	Chieko won a Province of Ontario Graduate Scholarship.
Steven Nusinowitz(Flock)	
Maureen Reed (Anstis)	Maureen had her NSERC Scholarship renewed.
Peter Oberle (Flock)	
Andrew Portal (Regan)	
Josée Rivest (Ono)	Josée had her NSERC Scholarship renewed.
James Tam (Ono)	James won an NSERC Postdoctoral Scholarship.
James Zacher (Howard)	James had his NSERC Scholarship renewed.

Research Grants

- Anstis** NSERC Operating Grant (continuation) for work on visual motion.
NSERC Equipment Grant.
President's NSERC Grant.
- Dawson** NSERC Operating Grant (new) for computational studies of vision.
President's NSERC Grant.
Faculty of Arts Grant.
- Flock** Faculty of Arts Grant.
- Grasse** NSERC Operating Grant (new) for electrophysiology.
NSERC Equipment Grant.
MRC Operating Grant (new).
MRC Equipment Grant.
President's NSERC Grant.
Excellence Fund Grant.
- Howard** NSERC Operating Grant (renewal) for work on visual stability.
DCIEM Contract for work on the visual-vestibular system.
DCIEM Contract for work on illusory self motion.
President's NSERC Grant.
- with Anstis, Grasse, Ono and Regan.** Five-year Province of Ontario Centres of Excellence Grant to establish a Laboratory for the Study of Human Performance in Space. Awarded June, 1987.
- Kaiser** NSERC Operating Grant (renewal) for work on colour vision.
President's NSERC Grant.
- Ono** NSERC Operating Grant (continuation) for work on binocular vision.
- Regan** NSERC Operating Grant (continuation) for work on visual information processing of motion and form.
NSERC Equipment grant.
MRC Operating Grant (continuation) for the assessment of visual pathway disorders.
- Stager** DCIEM Contract for evaluation of a visual horizon device.
Dept. of Transport Contracts for evaluating airtraffic systems.
U. B. C./ Mcmillan Bloedel Contract for evaluation of control systems for logging equipment.
- Steinbach** NSERC Operating Grant (renewal) for work on eye movements.
Atkinson College Research Grant for work on motion aftereffects.
- with Ono** NIH Grant (continuation) for work on monocular enucleation.

Total annual value of grants for June 1986-June 1987	\$787,000
Total annual value of grants for June 1987-June 1988	\$1,022,000

Books and Chapters in Books

- Anstis, S. M. (1986) Movement perception in the frontal plane: Sensory aspects In K. R. Boff, L. Kaufman and J. P. Thomas(Eds.) *Handbook of Perception and Human Performance*. Vol 1. New York: Wiley, pp. 16.1-16.27.
- Dawson, M. R. and Pylyshyn, Z. W. Natural constraints in apparent motion. In Z. W. Pylyshyn (Ed.), *From Feature Detection to Object Recognition*. Newark, New Jersey: Ablex, in press.
- Howard, I. P. The vestibular system. In K. R. Boff, L. Kaufman and J. P. Thomas (Eds.), *Handbook of Perception and Human Performance Vol. 1*. New York: Wiley, 1986, pp 11-1 to 11-30.
- Howard, I. P. The perception of posture, self motion and the visual vertical. In K. R. Boff, L. Kaufman and J. P. Thomas (Eds.), *Handbook of Perception and Human Performance Vol. 1*. New York, Wiley, 1986, pp. 18-1 to 18-62.
- Kaiser, P. Physiology and psychophysics of color vision. In S. F. Bergen and J. Preston (Eds.), *The Art of Science, Color and Aesthetics*. St. Louis, Mo,: Mosby, in press.
- Ono. H., Wagner, M. and Ono, K. S. Psychophysics II: Precision and accuracy. Iowa City: Conduit (Educational Computer Package).
- Regan, D. M., Kaufman, L. and Lincoln, J. Motion in depth and visual acceleration. In K. R. Boff, L. Kaufman and J. P. Thomas (Eds.), *Handbook of Perception and Human Performance Vol. 1*. New York: Wiley, 1986, pp 19-1 to 19-46.
- Regan, D. Binocular vision. In *Encyclopaedia of Physics in Medicine and Biology*. New York: Pergamon, 1986, pp. 33-34.
- Collewijn, H., Erkelens, C. J. and **Regan**, D. Absolute and relative disparity: A re-evaluation of their significance in perception and oculomotor control. In E. L. Keller and D. S. Zee (Eds.) *Adaptive Processes in Visual and Oculomotor Systems*. New York: Pergamon, 1986.
- Regan, D. Evoked potentials and color-defined categories. In S. Harnad (Ed.) *Categorical Perception*. New York: Cambridge University Press., 1987, pp.

443-451.

Regan, D. Human evoked potentials. In T. Picton (Ed.), *Human Event-related Potentials*. Amsterdam: Elsevier, 1987.

Regan, D. Human Brain *Electrophysiology: Evoked Potentials in Science and Medicine*. London: Chapman and Hall: New York: Wiley, in press.

Wagner, M., **Ono**, H. and Ono, K. S. Psychophysics I: Three classical methods. Iowa City: Conduit (Educational Computer Package).

Steinbach, M. J., Musarella, M. and Gallie, B. Extraocular muscle proprioception and visual function: Psychophysical aspects. In G. Lennerstrand, G. von Noorden and E. Campos (Eds.), *Strabismus and Amblyopia: Experimental Basis for Advances in Clinical Management* Macmillan, in press.

Papers in Refereed Journals

- Anstis, S. M. Visual stimuli on the Commodore Amiga: A tutorial *Behavior research methods, instruments & computers*, 1986, **18**, 535-541.
- Anstis, S. M., Cavanagh, P., Maurer, D., Lewis, T., Macleod, D. I. A. and Mather, G. Computer-generated screening test for color blindness *Color Research and Application*, 1986, **11**, S63-S66.
- Anstis, S. M. and Ramachandran, V.S. Entrained path deflection in apparent motion. *Vision Research*, 1986, **26**, 1731-1739.
- Anstis, S.M. and Rogers, B.J. Illusory continuous motion from oscillating positive-negative patterns: implications for motion perception. *Perception*, 1986, **15**, 627-640.
- Cavanagh, P. and Anstis, S.M. Brightness shift in drifting ramp gratings isolates a transient mechanism *Vision Research*, 1986, **26**, 899-908.
- Ramachandran, V.S. and Anstis, S.M. Figure-ground segregation modulates apparent motion *Vision Research*, 1986, **26**, 1969-1975.
- Ramachandran, V.S. and Anstis, S.M. The perception of apparent motion *Scientific American*, 1986, **6**, 102-109.
- Anstis, S. M., Cavanagh, P., Maurer, D., and Lewis, T. Optokinetic technique measures infants' responses to color. *Applied Optics*. 1987, 510-517.
- Anstis, S. M. and Ramachandran, V.S. Visual inertia in apparent motion *Vision Research*, 1987, **27**, 755-764.
- Anstis, S. M. and Harris, J. P. Magnification factor for adaptation of a visual transient mechanism *Journal of the Optical Society of America*, in press.
- Cavanagh, P. Macleod, D. I. A. and Anstis, S. M. Contribution of red, green and blue cones to the luminance pathways: Spatial and temporal factors. *Vision Research*, in press.
- Maurer, D., Lewis, T., Cavanagh, P., and Anstis, S. M. Luminous efficiency of colors in

infant vision. *Investigative Ophthalmology and Visual Science*, in press.

- Dawson, M. R. Moving contexts do affect the perceived direction of apparent motion in motion competition displays. *Vision Research*, 1987, **27**, 799-810.
- Dawson, M. R. and Harshman, R. A. The multidimensional analysis of asymmetries in alphabetic confusion matrices: Evidence for global-to-local and local-to-global processing. *Perception and Psychophysics*, 1986, **40**, 370-383.
- Flock, H. R. and Nusinowitz, S. Specularity, brightness, achromatic color and orthogonality. *Perception and Psychophysics*, in press.
- Grasse, K. L. and Cynadere, M. S. Response properties of single units in the accessory optic system of the dark-reared cat. *Developmental Brain Research*, 1986, **27**, 199-210.
- Howard, I. P. and Gonzalez, E. G. Optokinetic nystagmus in response to moving binocularly disparate stimuli. *Vision Research*, in press.
- Kaiser, P. and Ayama, M. Small, brief stimuli: An additivity experiment. *Journal of the Optical Society of America, A*, 1986, **3**, 930-934.
- Kaiser, P., Ayama, M. and Vimal, R. Flicker photometry: Residual minimum flicker. *Journal of the Optical Society of America, A*, 1986, **3**, 1989-1993.
- Kaiser, P., Ayama, M. and Nakatsue, T. Constant hue loci of unique and binary balanced hues at 10, 100 and 1000 td. *Journal of the Optical Society of America, A*, in press.
- Mapp, A. P. and Ono, H. The rhino-optical phenomenon: Ocular parallax and the visible field beyond the nose. *Vision Research*, 1986, **26**, 1163-1165.
- Mapp, A. P., Ono, H. and Saida, S. Extreme eye position and Hering's law of equal innervation. *Canadian Journal of Psychology*, 1986, **40**, 251-262.
- Murasugi, C. M., Howard, I. P. and Ohmi, M. Optokinetic nystagmus: The effects of stationary edges, alone and in combination with central occlusion. *Vision Research*, 1986, **26**, 1155-1162.

Ohmi, M. Howard I. P. and Everleigh, B. Directional preponderance in human optokinetic nystagmus. *Experimental Brain Research*, 1986, **63**, 387-394.

- Ohmi, M., Howard, I. P. and Landolt, J. The dependence of vection on the figure-ground relationships of competing stimuli. *Perception*, in press.
- Ono, H., Fay, A. and Tarbell, S. E. A "visual" explanation of facial vision. *Psychological Research*, 1986, **48**, 57-62.
- Ono, M. E., Rivest, J. and Ono, H. Depth perception as a function of motion parallax and absolute-distance information. *Journal of Experimental Psychology: Human Perception and Performance*, 1986, **12**, 331- 337.
- Higashiyama, A. and **Ono**, H. "Koko", "soko" and "asoko" ("here" and "there") as visual dividers of space. *Japanese Psychological Research*, in press.
- Regan, D. Form from motion parallax and form from luminance contrast: Vernier discrimination. *Spatial Vision*, 1986, **1**, 305-318.
- Regan, D. Visual processing of four kinds of relative motion. *Vision Research*, 1986, **26**, 127-145.
- Regan, D., Erkelens, C. J. and Collewijn, H. Necessary conditions for the perception of motion in depth. *Investigative Ophthalmology and Visual Science*, 1986, **27**, 584-597.
- Regan, D., Erkelens, J. and Collewijn, H. Visual field defects for vergence eye movements and for stereomotion perception. *Investigative Ophthalmology and Visual Science*, 1986, **27**, 806-816.
- Regan, D. and Maxner, C. Orientation-dependent loss of pattern sensitivity and flicker sensitivity in multiple sclerosis. *Clinical Vision Research*, 1986, **1**, 1-23.
- Regan, D. and Price, P. Periodicity in orientation discrimination and the unconfounding of visual information. *Vision Research*, 1986, **26**, 1299-1302.
- Regan, D. and Spekreijse, H. Evoked potentials in vision research: 1961-1985. *Vision Research*, 1986, **26**, 1461-1480.
- Regan, D. Sinewave gratings and low-contrast letter charts in ophthalmology and

neurology. *Clinical Vision Research*, in press.

- Regan, D. and Maxner, C. Orientation-selective visual loss in patents with Parkinson's disease. *Brain*, 1987, **110**, 239-271.
- Regan, D. and Regan, M. P. Objective evidence for phase-independent spatial frequency mechanisms in the human visual pathway. *Vision Research*, in press.
- Regan, D. and Regan, M. P. Human visual response to two-dimensional patterns cannot be explained entirely in one-dimensional Fourier terms. *Vision Research*, in press.
- Regan, D. and Regan, M. P. The transducer characteristics of hair cells in the human inner ear: a possible objective measure. *Brain Research*, in press.
- Apkarian, P., Tijssen, R., Spekrijje, H. and **Regan**, D. Origin of notches in CSF: optical or neural. *Investigative Ophthalmology and Visual Science*, 1987, **28**, 607-612.
- Erkelens, C. J. and **Regan**, D. Ocular vergence movements induced by changing size and disparity. *Journal of Physiology*, in press.
- Morgan, M. J. and **Regan**, D. Opponent model for line interval discrimination: interval and Vernier performance compared. *Vision Research*, 1987, **27**, 107-118.
- Steinbach, M. J. Inflow as a long-term calibrator of eye position in humans. *Acta Psychologica.*, 1986, **63**, 297-306.
- Steinbach M. J. Muscles as sense organs. *Archives of Ophthalmology*, 1986, **104**, 1148-1149.
- Steinbach, M. J., Kirshner, E. L., and Ono, K. Interactive computer-based apparatus for testing eye-hand coordination in children. *Binocular Vision*, 1986, **1**, 203-208.
- Steinbach, M. J. Proprioceptive knowledge of eye position. *Vision Research*, **27**, in press.

Steinbach, M. ., Kirshner, E. L., and Arstikaitis, M. J. Recession vs. marginal myotomy surgery for strabismus: Effects on spatial localization. *Investigative Ophthalmology and Visual Science*, in press.

Tam, W. J. and Ono, H. Binocular depth mixture? *Vision Research*, in press.

Barbeito, R., **Tam**, W. J. and Ono, H. Factors affecting saccadic amplitude during accommodative-disparity vergence. *Ophthalmic and Physiological Optics*, 1986, **2**, 201-205.

Total number of refereed papers 50

Published Proceedings

- Anstis, S. M. and Cavanagh, P. Optokinetic test for color vision in babies *Proceedings of the conference on non-invasive assessment of visual system. Optical Society of America, Monterey, CA., 1986.*
- Mather, G. and Anstis, S. M. Motion perception: Second thoughts on the correspondence problem. *Proceedings of SIGGRAPH conference on motion, Toronto (Ed. J. Tsotsos), Elsevier., 1987.*
- Dawson, M. R., Mazmanian, D. S. and Roberts, W. A. Towards a comparative psychology of cognitive content: Exploring tree preference asymmetries in humans, pigeons and monkeys. *Proceedings of the Eighth Annual Conference of the Cognitive Sciences. Hillsdale, N. J.: Erlbaum, 1986, pp. 627-638.*
- Regan, D. The eye in ballgames: hitting and catching. *Proceedings of Symposium "Sport en Zien 86", Vrieseborch, Harlem, pp. 7-32.*
- Regan, D. and Regan, M. P. Monocular and binocular processing of pattern and flicker investigated by nonlinear analysis. In C. Barber (Ed.), *Proceedings of the 3rd. International Evoked Potential Symposium, 1987.*
- Regan, D. and Regan, M. P. Dissecting the visual and auditory pathways by means of the two-input technique. In *Proceedings of AGARD Conference on Electric and Magnetic Activity of the Central Nervous System. Norway, May, 1987.*
- Regan, D. and Neima, D. Relation between VEP and visual functions ion lesions of the optic verve and visual pathway. In *Proceedings of AGARD Conference on Electric and Magnetic Activity of the Central Nervous System, Norway, May, 1987.*
- Stager, P. and Hameluck, D. Visual detection probabilities for search and rescue. *Proceedings of the Human Factors Association of Canada Annual Meeting, Vancouver, 1986.*
- Stager, P. and Hameluck, D. Estimating detection probabilities for search and rescue. *Proceedings of the Human Factors Society Annual Meeting, Dayton, Ohio, 1986.*

Steinbach, M. J. Behavioral and anatomical evidence for ocular muscle proprioception. In O. Tamura and J. Tsutsui (Eds.), *Proceedings of the International Workshop on Proprioception of the Ocular Muscles*. in press.

Talks and Abstracts

Anstis, S. M. Talk at the annual meeting of the AIC Interim Meeting, Toronto, 1986.

Anstis, S. M., Maurer, D., Lewis, T. and Cavanagh, P. Early maturation of luminous efficiency for colored stimuli. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1986, **27**, 264.

Cavanagh, P. and **Anstis**, S. M. Do opponent-color channels contribute to motion? *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1986, **27**, 291.

Anstis, S. M. and Harris, J. P. Magnification factor for adaptation of a transient mechanism. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 356.

Ramachandran, S. M., **Anstis**, S. M. and Rogers, D. R. Correspondence strength in apparent motion is amplified in multiple ambiguous displays. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 299.

Dawson, M. R. and Harshman, R. A. Multidimensional analysis of asymmetries in stimulus confusions. Paper presented at the Psychonomic Society, Toronto, June, 1986.

Dawson, M. R. and Wright, R. D. The relationships between moving contexts and the perceived direction of apparent motion. Paper presented to the Canadian Psychological Association, Toronto, June, 1986.

Harshman, R. A. and **Dawson**, M. R. Asymmetric processes in visual letter confusions as revealed by new multidimensional scaling method. Paper presented to Canadian Psychological Association, Toronto, June, 1986.

- Wright, R. D. and **Dawson**, M. R. The effects of apparent distance and meaningfulness on the visibility and direction of apparent motion. Paper presented to the Canadian Psychological Association, Toronto, June, 1986.
- Dawson, M. R., Wright, R. D. and Conforto, D. Testing independence assumptions in feature-integration theory. Paper presented to the Canadian Psychological Association, Vancouver, June, 1987.
- Wright, R. D. and **Dawson**, M. R. Evaluating the computation of inside/outside relationships. Paper presented to the Canadian Psychological Association, Vancouver, June, 1987.
- Giaschi, D. The perceived rate of apparent motion varies inversely with duty cycle. Invited paper presented to the Ontario Psychological Association, Feb., 1987.
- Giaschi, D. and Howard, I. P. Visual-vestibular interactions in the inhibition of nystagmus by an afterimage. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 315.
- Gonzalez, E., Wolf, M., Ono, H. and Steinbach, M. Depth perception in humans enucleated at an early age. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 296.
- Howard, I. P., Wright, M.J. and Ohmi, M. Properties of optokinetic nystagmus evoked by central and peripheral retina. Paper presented to the International Congress of Physiological Sciences, Oregon, July, 1986.
- Howard, I. P. Human optokinetic nystagmus: adaptations to the demands of higher visual functions. Paper presented at the European Vision Society Conference, Bad Nauheim, West Germany, Sept., 1986.
- Howard, I. P. Oculomotor signals from the central and peripheral retina. Invited paper presented to the American Optometry Society, Toronto, Dec. 1986.
- Kaiser, P., Vimal, R. L. P., Cowen, W. and Hibino, H. Luminance measured by nulling of apparent motion: An additivity experiment. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 93.

- Kirshner, E. L., Arstikaitis, M. J. and Steinbach, M. J. Effects of recession versus myotomy surgery on oculomotor proprioception. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 310.
- Mapp, A. P. and Ono, H. Localization of peripheral targets with and without saccadic eye movements. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 314.
- Murasugi, C. M. and Cavanagh, P. Anisotropy in the chromatic channel. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 214.
- Nusinowitz, S. Geometric cues and the direction of illumination. Paper presented to the Canadian Psychological Association, Toronto, 1986.
- Nusinowitz, S. Perceiving the direction of a light source. Paper presented to the Eastern Psychological Association, New York, 1986.
- Ohmi, M., and Howard, I. P. Effect of stationary objects on illusory self-translation induced by a looming display. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 296.
- Ono, H. Single and double vision. Invited paper to the Optical Society of America, 1986.
- Ono, H. Examining definitions of motion parallax. Invited paper given at the Annual meeting of the American Academy of Optometry, Toronto, 1986.
- Ono, H., Rogers, B. and Ohmi, M. Interactions between dynamic occlusion and motion parallax. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 300.
- Reed, M. J., Anstis, S. M. and Steinbach, M. J. Apparent motion perception in strabismus and amblyopia. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 312.
- Regan, D. Visual loss in patients with 20/20 vision. Invited lecture to the Annual meeting of the Optical Society of America, Seattle, 1986.
- Regan, D. Computational models in human vision. Invited lecture to the Rochester University Conference on Computational Vision, June, 1986.

- Regan, D. Form from motion contrast and form from luminance contrast. Invited lecture to the American Academy of Optometry, Toronto, Dec. 1986.
- Regan, D. Keynote lecture on Vision in Sport. European Sports Federation of the Netherlands, 1986.
- Regan, D. Visual Processing of motion. Invited lecture to the Netherlands Biophysical Society, Soesterberg, Holland, 1986.
- Regan, D. and Regan, M. P. Spatial frequency tuning and orientation tuning in pattern evoked potentials: non-linear analysis. Paper presented at the International Evoked Potential symposium, Berlin, 1986.
- Regan, M. P.. and Regan, D. Monocular and binocular nonlinearities in flicker evoked potentials. Paper presented at the International Evoked Potentials Symposium, Berlin, 1986.
- Regan, M. P. and Regan, D. Nonlinear analysis of spatial vision. Paper presented to the Optical Society of America, 1986.
- Price, P. **Regan**, D. and **Regan**, M. P. Periodicity in orientation discrimination. Paper presented to the Optical Society of America.
- Regan, D. and Regan, M. P. Objective evidence for a phase-independent spatial frequency mechanism in the human visual pathway. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 127.
- Regan M. P. and Regan, D. Orientation tuning and spatial frequency tuning of a phase independent brain response. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)*, 1987, **28**, 127.
- Rivest, J. and Ono, H. Apparent distance and convergence as distance cues in depth perception from motion parallax. *Investigative Ophthalmology and Visual Science (ARVO Suppl.)* 1987, **28**, 296.
- Steinbach, M. J. Anatomy and function of the eye's proprioceptors" Can they specify eye position. Invited talk to the International Workshop on proprioception of the ocular muscles, Japan, 1986.

Steinbach, M. J. Depth perception in humans enucleated at an early age. Organizer and speaker in symposium on Monocular depth perception: the power of parallax. Paper presented to the Annual Meeting of the American Academy of Optometry, Toronto, 1986.

Steinbach, M. J. Extraocular muscle proprioception and visual function: Psychophysical aspects. Invited presentation, Wenner-Gren Symposium on Strabismus and Amblyopia, Stockholm, 1987.

Reports and Patents

Hameluck, D. and Stager, P. The peripheral vision horizon display: A critical review. Report on Contract W7711-6-9116/01-SE for the Defence and Civil Institute of Environmental Medicine, Feb., 1987.

Hameluck, D. and Stager, P. The peripheral vision horizon display: Analysis of eye movements. Report on Contract W7711-6-9116/01-SE for the Defence and Civil Institute of Environmental Medicine, March, 1987.

Howard, I. P. Studies on human orientation and disorientation. Final Report on Contract 97711-3-7595/8SE83-00221 for the Defence and Civil Institute of Environmental Medicine, April, 1987.

Stager, P. and Hameluck, D. Contrast sensitivity and visual detection in search and rescue. Report on Contract DSS 8SE85-00265 for the Defence and Civil Institute of Environmental Medicine, June, 1986.

Guzman, O. and Steinbach, M. Method and apparatus for manipulating the contrast in sine wave gratings and other visual patterns. U. S. Patent 4,384,768.

Colloquia

Stuart Anstis

Nordita (Institute of Atomic Physicists), Copenhagen, Denmark, 1986.
Department of Psychology, University of Toledo, Ohio, November, 1986.
Whitaker College, Massachusetts Institute of Technology (MIT), Feb. 1987.
Department of Psychology, Universite de Montreal, March 1987.

Michael Dawson

Department of Psychology, York University, 1986.
McCluhan Centre, University of Toronto, 1987.
Department of Psychology, University of Alberta, 1986.

Colloquia (cont.)**Ian Howard**

Department of Physiology, Free University of Berlin, Aug., 1986.

Institute of Neurology, Munich, Sept., 1986.

Institute of Neurology, Tübingen, Sept., 1986.

Institute of Neurology, Freiberg, Sept., 1986.

Department of Psychology, University of Toronto, Dec., 1986.

Department of Psychology, University of Guelph, March, 1987.

National Institute of Health, Washington, Feb., 1987.

Department of Psychology, University of Louisville, Feb., 1987.

Department of Psychology, University of Western Ontario, April, 1987.

Peter Kaiser

Department of Psychology, York University, April, 1987.

Hiroshi Ono

Department of Psychology, Vanderbilt University, Nov., 1986.

David Regan

Department of Medical Physics, University of Nijmegen, 1986.

Department of Ophthalmology, University of Amsterdam, 1986.

Department of Ophthalmology, University of Louvain, Belgium, 1986.

Department of Physics, University of Utrecht, The Netherlands, 1986.

Neuroscience Centre, London University, 1986.

Department of Physics, NRC, Ottawa, 1986.

Departments of Physiology and Psychology, UBC, Vancouver, 1986.

Department of Brain Science and Cognition, MIT, 1986.

Department of Psychology, York University, 1986.

Departments of Psychology, Ophthalmology, Computer Science and the Playfair Institute of the University of Toronto, 1986-87.

Airforce Office of Scientific Research, Washington, 1987.

Hospital for Sick Children, Toronto, June, 1987.

Paul Stager

Graduate courses taught at Simon Fraser and Victoria Universities, Summer, 1986.

Two colloquia given to the Defence and Civil Institute of Aviation Medicine.

Martin Steinbach

Jampolsky Fellows Meeting, New Orleans, Louisiana, 1986.

Hospital for Sick Children, Toronto, 1986 and 1987.

Tokyo Metropolitan Neurosciences Institute, June, 1986.

Department of Ophthalmology, University of Toronto, 1986.

Vision Group Seminars

- David Regan. *The Neural Processing of Motion and Spatial Form.*
- Michael Wright Brunel University, London. *The Analysis of Velocity in Central and Peripheral Vision.*
- Ian Howard. *Sensory Factors in the Control of Pursuit Eye Movements.*
- Nicholas Swindale Dalhousie University. *Neural Mechanisms of Visual Acuity.*
- Michael Dawson. *Analyzing Asymmetries in Stimulus Confusion Matrices.*
- Fred Miles National Institute of Health . *Visual Stabilization of the Eyes.*
- Haruo Hibino. *The Effect of Chromatic Adaptation on Minimally Distinct Border.*
- Ram Vimal. *Spatial Frequency Tuning and Discrimination.*
- Patrick Cavanagh University of Montreal. *Shape from Shadows.*
- Marilyn Schneck Hospital for Sick Children. *Scotopic Vision in infants.*
- Andrew Monk York University, England. *Word Recognition.*
- Steve Ellis Ames Laboratories, California. *Exocentric Direction Judgments.*
- Brock Fenton Biology Department, York. *Sensory Performance in Bats.*
- Hansraj Doma University of Toronto. *Rods, Cones and Saccades.*

Plans for the Coming Year

Brian Rogers of the Department of Experimental Psychology, Oxford is coming in September to spend several weeks in the department.

Dr. Saida of the Industrial Products Research Institute of Japan will be visiting York from June 7th. to July 7th.

John Findlay of the Department of Psychology, Durham University will be with us for about two weeks in October.

Professor Emiko Inoue from Japan is coming in September to spend six months working with Ian Howard.

Michael Jenkins has been appointed as Assistant Professor in the Department of Computer Science at York. Michael is a graduate of the Computer Science Department at the University of Toronto and is interested in computational approaches to vision.

David Regan has just been awarded a grant of approximately one million dollars from the United States Airforce Office of Scientific Research. This is a first installment towards the cost of a neuromagnetometer; an instrument for studying magnetic potentials associated with neural activity in local regions of the human brain. It will be used for studying visual and auditory processes in normal humans and in patients with disorders of vision and hearing.

We are taking the initiative in organizing a weekend conference on vision at Glendon College at the end of September or in October, 1987. The hope is that visual scientists, including graduate students, in and around Toronto will get to know each other and found a local Vision Society.

Martin Steinbach is collaborating with the University of Toronto and the newly formed Eye Institute of Ontario in the organization of an Oculomotor Symposium to be held in April, 1988. David Robinson will be the Keynote speaker.

