

Douglas P. Munoz

PRESENT POSITION:

Director, Centre for Neuroscience Studies
Professor in Biomedical and Molecular Sciences, Psychology, and Medicine
Member CAPnet: Canadian Action and Perception Network

PRESENT ADDRESS:

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EDUCATION:

BSc (1982) McGill University Honours Biology, Neurobiology
PhD (1988) McGill University Neurology and Neurosurgery, Dean's Honours List

ACADEMIC AWARDS:

Medical Research Council (MRC) of Canada Studentship, 1982-1987.
Donald B. Lindsley Prize, 1989. Presented by the Society for Neuroscience for the most outstanding thesis in behavioral neuroscience.
Natural Sciences and Engineering Research Council of Canada Postdoctoral Fellowship, 1989.
MRC of Canada, Postdoctoral Fellowship, 1990-1991.
Alfred P. Sloan Research Fellow, 1993-1995.
EJLB Foundation Research Scholar, 1996-1998.
MRC of Canada, Scientist Award, 1997-2002.
Basmajian Award, Awarded for excellence in research in the Faculty of Health Sciences, Queen's University, 1997.
Premier's Research Excellence Award, Awarded for excellence in research by the Ontario Government, 1999.
Canada Research Chair Program: Tier I Chair in Neuroscience, 2001-2008; renewed for 2008-2015.
Aesculapian Society of Queen's University, Medicine Phase IIB Teaching Award, 2001.

PROFESSIONAL ASSOCIATIONS

Society for Neuroscience (President of the Kingston Chapter; 2011-present Program Committee)
Canadian Physiological Society (Councilor: 2000-2003)
American Physiological Society
Society for the Neural Control of Movement (Board of Trustees: 1999-2002; 2008-2010; 2010-present VP and Program Chair)
Cognitive Neuroscience Society
Canadian Society for Brain, Behaviour, and Cognitive Science

Canadian Association for Neuroscience (Board member: 2009-2012; Vice President 2012-present)
American Medical School Neuroscience Department Chairs (Board member: 2010-2012)
CIHR Institute of Neuroscience Mental Health and Addiction (INMHA) Board member: 2009-present)
Brain Canada (Scientific Advisory Committee: 2012-present)

ACADEMIC APPOINTMENTS:

1991-1997: Assistant Professor of Physiology and Member of the MRC Group in Sensory-Motor Neuroscience, Queen's University, Kingston, Ontario, Canada.
1997-2000: Associate Professor of Physiology and Member of the MRC Group in Sensory-Motor Neuroscience, Queen's University, Kingston, Ontario, Canada.
1998-present: Associate Professor of Psychology, Queen's University, Kingston, Ontario, Canada.
2000-present: Professor of Physiology, Member of the CIHR Group in Sensory-Motor Systems, Queen's University, Kingston, Ontario, Canada.
2001-present: Director of the Centre for Neuroscience Studies, Queen's University, Kingston, Ontario, Canada
2007-present; Professor of Medicine, Queen's University, Kingston, Ontario, Canada.
2007-present; Professor of Biomedical and Molecular Sciences, Queen's University, Kingston, Ontario, Canada.

RESEARCH EXPERIENCE:

1980-1982: Honours student independent study project (Supervisor: Dr. R. Chase; Department of Biology, McGill University, Montreal, Quebec, Canada).
1982-1988: Doctoral thesis (Supervisor: Dr. D. Guitton; Department of Neurology and Neurosurgery, McGill University, Montreal, Quebec, Canada).
1988-1989: Postdoctoral fellow (Supervisor: Dr. D. Guitton; Department of Neurology and Neurosurgery, McGill University, Montreal, Quebec, Canada).
1989-1992: Postdoctoral fellow (Supervisor: Dr. R. H. Wurtz; Laboratory of Sensorimotor Research, National Eye Inst., National Institutes of Health, Bethesda, MD, USA).

SCHOLARLY ACTIVITY:

Reviewer for Science, Nature, Nature Neuroscience, Neuron, Journal of Neuroscience, Journal of Neurophysiology, Perception and Psychophysics, Journal of Experimental Psychology: Human Perception and Performance, Experimental Brain Research, Vision Research, Journal of Cognitive Neuroscience, Brain, Neuropsychologia, Cerebral Cortex, Behavioural and Brain Sciences, Investigative Ophthalmology and Visual Science, Muscle and Nerve, Visual Neuroscience, Optometry and Vision Science, Ophthalmology, Gerontology, Abnormal Psychology, Biological Psychiatry, Current Opinion in Biology, NeuroImage, Trends in Cognitive Science

Guest editor for Canadian Journal of Physiology and Pharmacology, Progress in Brain Research

Associate editor for European Journal of Neuroscience (July, 2008 – present)

Grant Review committees:

Canadian Institutes for Health Research - Neuroscience B (1997-2000); CIHR - Investigator (2000-2003); Chair, Neuroscience A (2004 – 2007, 2009, 2010-2011). NIMH Interdisciplinary Behavioral Science Centers for Mental Health (2002), NIMH Conte Center for the Neuroscience of Mental Disorders (2003). Human Frontiers Science Program Long Term Fellowship Committee (2003 - 2007), Grant review committee (2010). Member of the College of Reviewers for the Canada research Chair Program (2001 – present). EJLB Foundation Scientific reviewer (2006), National Science Foundation: collaborative research in computational neuroscience (2009).

Grant reviews external: Medical Research Council of Canada, National Sciences and Engineering Research Council of Canada, Canada Foundation for Innovation, Human Frontiers Science Program, National Science Foundation (USA), Wellcome Trust (UK), Ontario Mental Health Foundation, Fonds de la Recherche en Santé du Québec, Alberta Heritage Foundation, New Zealand Neurological Foundation, Netherlands Earth and Life Sciences.

Other Services: Councilor Canadian Physiological Society (1999-2002), board member Society for the Neural Control of Movement (1999-2002; 2008-2011) and VP Program Chair (2010-present), Councilor Association of Medical School Neuroscience Department Chairpersons (2009-2012), Member Society for Neuroscience Lindsley Prize committee (2005-2008), President of the Kingston Chapter of Society for Neuroscience (1997-present). CIHR Institute of Neuroscience Mental Health and Addiction (INMHA) Advisory Board: 2009-present). Canadian Association for Neuroscience Executive (2009 – present).

Organization of International Meetings:

International Symposium in Sensory-Motor Research: *What Are the Big Questions for the next millennium?* Symposium in Honour of retired of Dr. Vivian Abrahams, Kingston, Ontario, June, 1995.

European Conference on Eye Movements 11th Meeting, Turku, Finland, August, 2001.

Multisensory Integration Subserving Orienting Behaviour. Satellite meeting for the 2002 Neural Control of Movement meeting Naples, Florida April, 2002.

International Symposium on *Eye-hand coordination*, Kingston, Ontario, May, 2002.

Canadian Physiological Society winter meeting, Sainte Anne de Beaupre, Quebec, Feb, 2003.

Canadian Physiological Society winter meeting and Dan Guitton recognition symposium, Sainte Anne de Beaupre, Quebec, Feb, 2005.

Neural Control of Movement (2010-2013): VP and Program Chair for the annual meeting

Canadian Association for Neuroscience (2011-2012) Chair Program Committee for the Annual Meeting: Quebec City (vice-chair: 2011) and Vancouver, (chair: 2012).

RESEARCH FUNDING:

For each of the grants listed below Munoz was either the principal investigator or co-investigator on a collaborative grant.

1991-1995: **Medical Research Council of Canada** Group Grant. (PI: VC Abrahams, Queen's University) Neurophysiological Mechanisms Underlying the Control of Orientation. \$75,000 / year.

1993-1995: **Alfred P. Sloan Foundation** Research Fellowship. \$15,000 US/ year (PI D. P. Munoz)

1995-1996: **J. P. Bickell Foundation**. Eye movements in humans with attention-deficit hyperactivity disorder. \$22,643 (PI D. P. Munoz)

1995-2000: **Medical Research Council of Canada** Group Grant. (PI: FJR Richmond, Queen's University) \$139,000 / year.

1995-2000: **Medical Research Council of Canada**. Neural Mechanisms Controlling Oculomotor Function. \$54,000 / year. (PI D. P. Munoz).

1995-1998: **Natural Sciences and Engineering Research Council**. Selection of Objects by the Primate Oculomotor System. (PI: RM Klein, Dalhousie University) \$100,000 / year.

1996-1999: **EJLB Foundation** Research Fellowship. Using Eye Movements to Probe Frontal Lobe Function and Dysfunction. \$100,000 / year. (PI D. P. Munoz)

1998-2001: **Human Frontiers Science Program**. Multisensory Interactions Subservicing Orienting Behavior. (PI: AJ Van Opstal, University of Nijmegen, Nijmegen, the Netherlands) \$232,000 US / year.

1998-2001: **McDonnell-Pew Cognitive Neuroscience Program**. On the relationships between overt and covert shifts of visual attention. (PI: RM Klein, Dalhousie University). \$50,000 US / year.

1999-2002: **Medical Research Council of Canada**. Laboratory for Functional Magnetic Resonance Research. (PI: RS Menon, University of Western Ontario) \$115,150 / year

1999-2000: **Tourette Syndrome Association**. Eye and hand coordination in Tourette Syndrome \$36,490 US / year (PI D. P. Munoz)

1999-2004: **Premier's Research Excellence Award** \$100,000 (\$20,000/year) (PI D. P. Munoz)

2000-2005: **Canadian Institutes of Health Research**. Understanding neuronal circuitry controlling visual fixation and saccade generation \$142,504 / year.) (PI D. P. Munoz)

2000-2003: **Canadian Institutes of Health Research**. Visual guidance of hand movements in object manipulation (PI: JR Flanagan, Queen's University) \$43,560 / year.

2000-2005: **Canadian Institutes of Health Research** Group Grant. Sensory-motor systems: studies of behaviour, dysfunction and plasticity. (PI: PK Rose, Queen's University) \$343,861 / year.

2000: **Canada Foundation for Innovation/Ontario Innovation Trust**. Eye-Hand Coordination: Laboratories to Study the Neural and Behavioural Basis of Motor Function and Dysfunction. (PI: JR Flanagan, Queen's University) \$1,110,915.

2001-2008: **Canada Research Chair Program**. CRC Tier I Chair in Neuroscience, \$200,000 / year. (PI D. P. Munoz)

2001: **Canada Foundation for Innovation/Ontario Innovation Trust**: Primate Neurophysiology Lab and Human Oculomotor Lab Infrastructure \$312,500. (PI D. P. Munoz)

2002-2007: **Canadian Institutes of Health Research**. Laboratory for Functional Magnetic Resonance Research. (PI: RS Menon, University of Western Ontario) \$146,748 / year

2002-2007: **Ontario Research and Development Challenge Fund**. Behavioural Research and Imaging Network (PI: R McIntosh, University of Toronto) \$120,000 / year to Queen's University.

2003-2008: **Canadian Institutes of Health Research**. Operating grant. Using eye movements to probe brain function and dysfunction in humans \$137,360 / year. (PI D. P. Munoz)

- 2004: **Canada Foundation for Innovation/Ontario Innovation Trust:** Mobile laboratories for clinical, behavioural and genetic subgrouping of families with autism spectrum disorders and developmental disabilities. (PI: J. Holden, Queen's University) \$1,148,483.
- 2005-2008: **Human Frontiers Science Program** Neural substrate of bottom-up and top-down visual attentional integration \$450,000 US / year (PI D. P. Munoz)
- 2005-2010: **Canadian Institutes of Health Research:** Operating Grant. Understanding neuronal circuitry controlling visual fixation and saccade generation \$201,547 / year. (PI D. P. Munoz)
- 2005-2010 **Canadian Institutes of Health Research** Group Grant. Sensory motor integration: from reflexes to social interactions. \$378,350 / year (PI D. P. Munoz and P. K. Rose).
- 2005-2008 **National Science Foundation** CRCNS Collaborative Research: Characterizing Bayesian Surprise in Humans and Monkeys. \$467,460 US dollars. (PI L Itti, University of Southern California).
- 2006-2007 **Canadian Institutes of Health Research:** Institute of Aging Pilot Project: Normal and abnormal cognition in aging: Evaluation of eye movements, psychometric testing and functional MRI. \$50,000 (PI D. P. Munoz).
- 2006-2009 **Canadian Institutes of Health Research:** Research Resource Grant Program: Peripheral equipment and maintenance of facility for functional magnetic resonance imaging in humans and non-human primates. \$46,364/yr + \$196,232 equipment (PI D. P. Munoz)
- 2006-2011 **Canadian Institutes of Health Research:** New Emerging Team Grant: Early Life Events and First Episodes of Brain Disorders. Fetal alcohol spectrum disorders: perinatal mechanisms, treatments, and diagnostic neuromarkers. \$300,000/yr (PI J. N. Reynolds).
- 2007 **Canada Foundation for Innovation/Ontario Innovation Trust:** Development of new assessment tools for evaluation of brain function and dysfunction. \$17,525,705 (PI D. P. Munoz).
- 2007 **Friends of Parkinson's Research:** Using functional brain imaging to investigate cognitive abnormalities in Parkinson's Disease. \$23,500 (PI G. Pari).
- 2008-2015: **Canada Research Chair Program.** CRC Tier I Chair in Neuroscience, \$200,000 / year. (PI D. P. Munoz)
- 2008-2012: **Canadian Institutes of Health Research. Collaborative Research in Computational Neuroscience:** Neural basis of active perception in natural environment. \$80,000 / year (co-PI L. Itti and D. P. Munoz).
- 2009-2015: **National Sciences and Engineering Research Council.** CREATE Training grant in neurocomputation. \$300,000 / year (PI M. A. Goodale).
- 2009-2014: **Canadian Institutes of Health Research.** Operating grant. Using eye movements to probe brain function and dysfunction in humans. \$190,677/year (PI D. P. Munoz).
- 2009-2011: **Defense Advanced Research Projects Agency (DARPA):** Neovision2. (Phase 1 - 18 months: \$453,187) (PI L. Itti).
- 2010: **Canadian Institutes of Health Research: Meetings, Planning and Dissemination Grant:** Canadian Action and Perception Network: Strategic Planning Meeting. \$5,000 (PI D. P. Munoz).
- 2010-2015 **Ontario Research Fund: Research Excellence:** Quantifying sensorimotor function and dysfunction. \$2,940,000 (PI S. H. Scott)
- 2011-2016: **Canadian Institutes of Health Research.** Operating grant. Understanding the neuronal circuitry controlling voluntary and automatic saccade generation. \$179,550/year (PI D. P. Munoz).

2011-2013: **ALS Society of Canada**. Using eye movements and functional brain imaging to investigate cognitive deficits in ALS. \$100,000 (PI D. P. Munoz).

PATENTS:

Title: *Method and Apparatus for Detecting Eye Movement*

Authors: Munoz, D.P., Loeb, G.E., Hampton, K.A. and Ten Hove, M.

Description: An apparatus for diagnosing a neurological disorder in a subject by detecting the subject's eye movement comprises a helmet for blocking visual stimuli from the subject's visual field. A method is provided for diagnosing a neurological disorder in a subject, using an apparatus according to the invention, comprising determining, in accordance with a selected paradigm, whether the direction of the subject's eye movement in response to the switching on of either the right or the left visual cues is correct. After a prescribed number of trials, a score corresponding to the total number of correct eye movements is obtained, wherein the score is diagnostic of the neurological disorder.

Patent No.: 6,231,187

Inventors: Douglas P. Munoz, Gerald E. Loeb, Martin W. ten Hove, Karen A. Hampton

Title: *Eye-Tracking Apparatus for Screening Human Diseases*

Authors: Po-He Tseng, Ian G. Cameron, Douglas P. Munoz and Laurent Itti

Description: A simple apparatus for diagnosing a neurological disorder consists of two computers, one to present video clips, and one to record eye-movement patterns, and a headband worn by a human subject that contains an eye-movement recording camera. For data analysis, a third computer is used to compare the subject's eye-movement patterns with a computer model of the "saliency" of the visual objects that were present in the video clips. Different visual objects possess different saliency values, corresponding to how likely they are to attract attention or "stand out" against the rest of the scene. After a prescribed number of video clips, an score of how close the subject's eye-movement patterns corresponded to what was considered salient is obtained, wherein the score is diagnostic of a particular neurological disorder.

Application Serial No.: 61/145,011

Inventors: Po-He Tseng, Ian G. Cameron, Douglas P. Munoz and Laurent Itti

PUBLICATIONS (refereed journals):

Munoz, D.P., Pawson, P.A., and Chase, R. (1983) Symmetrical giant neurons in asymmetrical ganglia: implications for evolution of the nervous system in pulmonate molluscs. *J. Exp. Biol.* 107: 147-161.

Munoz, D.P. and Guitton, D. (1985) Tectospinal neurons in the cat have discharges coding gaze position error. *Brain Res.* 341: 184-188.

Munoz, D.P. and Guitton, D. (1986) Presaccadic burst discharges of tecto-reticulo-spinal neurons in the alert head-free cat. *Brain Res.* 398: 185-190.

Munoz, D.P. and Guitton, D. (1989) Fixation and orientation control by the tecto-reticulo-spinal system in the cat whose head is unrestrained. *Rev. Neurol. (Paris)* 145: 567-579.

Pelisson, D., Guitton, D. and Munoz, D.P. (1989) Reference frame of compensatory gaze shifts generated by the head-free cat following stimulation-induced perturbations in gaze position. *Exp. Brain Res.* 78: 654-658.

- Guitton, D., Munoz, D.P. and Galiana, H.L. (1990) Gaze control in the cat: studies and modelling of the coupling between orienting eye and head movements in different behavioral tasks. *J. Neurophysiol.* 64: 509-531.
- Munoz, D.P., Pelisson, D., and Guitton, D. (1991) Movement of neural activity on the superior colliculus motor map during gaze shifts. *Science* 251: 1358-1360.
- Guitton, D. and Munoz, D.P. (1991) Control of orienting gaze shifts by the tectoreticulospinal system in the head-free cat. I. Identification, localization, and effects of behavior on sensory responses. *J. Neurophysiol.* 66: 1605-1623.
- Munoz, D.P. and Guitton, D. (1991) Control of orienting gaze shifts by the tectoreticulospinal system in the head-free cat. II. Sustained discharges during motor preparation and fixation. *J. Neurophysiol.* 66: 1624-1641.
- Munoz, D.P., Guitton, D., and Pelisson, D. (1991) Control of orienting gaze shifts by the tectoreticulospinal system in the head-free cat. III. Spatio-temporal characteristics of phasic motor discharges. *J. Neurophysiol.* 66: 1642-1666.
- Munoz, D.P. and Wurtz, R.H. (1992) Role of the rostral superior colliculus in active visual fixation and execution of express saccades. *J. Neurophysiol.* 67: 1000-1002.
- Guitton, D., Munoz, D. P., and Pelisson, D. (1993) Are gaze shifts controlled by a 'moving hill' of activity in the superior colliculus? Reply. *Trends Neurosci.* 16: 216-217
- Munoz, D. P. and Wurtz, R. H. (1993) Fixation cells in monkey superior colliculus. I. Characteristics of cell discharge. *J. Neurophysiol.* 70: 559-575
- Munoz, D. P. and Wurtz, R. H. (1993) Fixation cells in monkey superior colliculus. II. Reversible activation and deactivation. *J. Neurophysiol.* 70: 576-589.
- Munoz, D. P. and Corneil, B. D. (1995) Evidence for interactions between target selection and visual fixation for saccade generation in humans. *Exp. Brain Res.* 103: 168-173.
- Munoz, D. P. and Wurtz, R. H. (1995) Saccade-related activity in monkey superior colliculus. I. Characteristics of burst and buildup cells. *J. Neurophysiol.* 73: 2313-2333.
- Munoz, D. P. and Wurtz, R. H. (1995) Saccade-related activity in monkey superior colliculus. II. Spread of activity during saccades. *J. Neurophysiol.* 73: 2334-2348.
- Dorris, M. C. and Munoz, D. P. (1995) A neural correlate for the gap effect on saccadic reaction times in monkey. *J. Neurophysiol.* 73: 2558-2562.
- Munoz, D. P., Waitzman, D. M., and Wurtz, R. H. (1996) Activity of neurons in monkey superior colliculus during interrupted saccades. *J. Neurophysiol.* 75: 2562-2580.
- Goldring, J. E., Dorris, M. C., Corneil, B. D., Ballantyne, P. A. and Munoz, D. P. (1996) Combined eye-head gaze shifts to visual and auditory targets in humans. *Exp. Brain Res.* 111: 68-78.
- Paré, M. and Munoz, D. P. (1996) Saccadic reaction time in the monkey: advanced preparation of oculomotor programs is primarily responsible for express saccade occurrence. *J. Neurophysiol.* 76: 3666-3681.
- Corneil, B. D. and Munoz, D. P. (1996) The influence of auditory and visual distractors on human orienting gaze shifts. *J. Neurosci.* 16: 8193-8207.
- Dorris, M. C., Paré, M. and Munoz, D. P. (1997) Neural activity in monkey superior colliculus related to the initiation of saccadic eye movements. *J. Neurosci.* 17: 8566-8579.
- Everling, S., Paré, M., Dorris, M. C., Munoz, D. P. (1998) Comparison of the discharge characteristics of brainstem omnipause neurons and superior colliculus fixation neurons in monkey: implications for control of fixation and saccade behavior. *J. Neurophysiol.* 79: 511-528.

- Munoz, D. P. and Istvan, P. J. (1998) Lateral inhibitory interactions in the intermediate layers of the monkey superior colliculus. *J. Neurophysiol.* 79: 1193-1209.
- Munoz, D. P., Broughton, J. R., Goldring, J. E., and Armstrong, I. T. (1998) Age-related performance of human subjects on saccadic eye movement tasks. *Exp. Brain Res.* 121: 391-400.
- Dorris, M. C. and Munoz, D. P. (1998) Saccadic probability influences motor preparation signals and time to saccadic initiation. *J. Neurosci.* 18: 7015-7026.
- Everling, S., Dorris, M. C., and Munoz, D. P. (1998) Reflex suppression in the anti-saccade task is dependent on prestimulus neural processes. *J. Neurophysiol.* 80:1584-1589.
- Taylor, T. L., Klein, R. M., and Munoz, D. P. (1999) Saccadic performance as a function of the presence and disappearance of auditory and visual fixation stimuli. *J. Cog. Neurosci.* 11: 205-212.
- Everling, S., Dorris, M. C., Klein, R. M. and Munoz, D. P. (1999) Role of primate superior colliculus in preparation and execution of anti- and pro-saccades. *J. Neurosci.* 19: 2740-2754.
- Dorris, M. C., Taylor, T. L., Klein, R. M., and Munoz, D. P. (1999) Influence of the previous stimulus or saccade on saccadic reaction times in monkey. *J. Neurophysiol.* 81: 2429-2438.
- Corneil, B. D., Hing, C. A., Bautista, D. V., and Munoz, D. P. (1999) Human eye-head gaze shifts in a distractor task. I. Truncated gaze shifts. *J. Neurophysiol.* 82: 1390-1405.
- Corneil, B. D. and Munoz, D. P. (1999) Human eye-head gaze shifts in a distractor task. II. Reduced threshold for initiation of early head movements. *J. Neurophysiol.* 82: 1406-1421.
- Dorris, M. C. and Munoz, D. P. (1999) The underrated role of the “move system” in determining saccade latency. *Behav. Brain Sci.* 22: 681-682.
- Olivier, E., Dorris, M. C., and Munoz, D. P. (1999) Lateral interactions in the superior colliculus, not an extended fixation zone, can account for the remote distractor effect. *Behav. Brain Sci.* 22: 694-695.
- Dorris, M. C., Paré, M., and Munoz, D. P. (2000) Immediate neural plasticity shapes motor performance. *J. Neurosci.* 20: RC52(1-5).
- Everling, S. and Munoz, D. P. (2000) Neuronal correlates for preparatory set associated with saccade generation in the primate frontal eye field. *J. Neurosci.* 20: 387-400.
- Cabel, D. W. J., Armstrong, I. T., Reingold, E., and Munoz, D. P. (2000) Control of saccade initiation in a countermanding task using visual and auditory stop signals. *Exp Brain Res.* 133: 431-441.
- Munoz, D. P., Dorris, M. C., Paré, M., and Everling, S. (2000) On your mark, get set: brainstem circuitry underlying saccadic initiation. *Can. J. Physiol. Pharmacol.* 78: 934-944.
- Bell, A. H., Everling, S., and Munoz, D. P. (2000) The influence of stimulus eccentricity and direction on characteristics of pro- and anti-saccades in non-human primates. *J. Neurophysiol.* 84: 2595-2604.
- Trappenberg, T. P., Dorris, M. C., Munoz, D. P., and Klein, R. M. (2001) A model of saccade initiation based on the competitive integration of exogenous and endogenous signals in the superior colliculus. *J. Cog. Neurosci.* 13: 256-271.
- Paré, M. and Munoz, D. P. (2001) Expression of a re-centering bias in saccade regulation by superior colliculus neurons. *Exp. Brain Res.* 137: 354-368.
- Luna, B., Thulborn, K. R., Munoz, D. P., Merriam, E. P., Garver, K. E., Minchew, N. J., Keshavan, M. S., Genovese, C. R., Eddy, W. F., and Sweeney, J. A. (2001) Maturation of widely distributed brain function subserves cognitive development. *Neuroimage* 13: 786-793.

- Bell, A. H., Corneil, B. D., Meredith, M. A., and Munoz, D. P. (2001) The influence of stimulus properties on multisensory processing in the awake primate superior colliculus *Can. J. Exp. Psychol.* 55: 125-134.
- LeVasseur, A. L., Flanagan, J. R., Riopelle, R. J., and Munoz, D. P. (2001) Control of volitional and reflexive saccades in Tourette's syndrome. *Brain* 124: 2045-2058.
- Corneil, B. D., Olivier, E., Richmond, F. J. R., Loeb, G. E. and Munoz, D. P. (2001) Neck muscles in the rhesus monkey. II. Electromyographic patterns of activation underlying postures and movements. *J. Neurophysiol.* 86: 1729-1749.
- Gore, J. L., Dorris, M. C., and Munoz, D. P. (2002) Time course of a repetition effect on saccadic reaction time in non-human primates. *Arch. Ital. Biol.* 140: 203-210.
- Corneil, B. D., Van Wanrooij, M., Munoz, D. P., and Van Opstal, A. J. (2002) Auditory-visual interactions subserving goal-directed saccades in a complex scene. *J. Neurophysiol.* 88: 438-454.
- Corneil, B. D., Olivier, E., and Munoz, D. P. (2002) Neck muscle responses to stimulation of monkey superior colliculus. I. Topography and manipulation of stimulation parameters. *J. Neurophysiol.* 88: 1980-1999.
- Corneil, B. D., Olivier, E., and Munoz, D. P. (2002) Neck muscle responses to stimulation of monkey superior colliculus. II. Gaze shift initiation and volitional head movements. *J. Neurophysiol.* 88: 2000-2018.
- Dorris, M. C., Klein, R. M., Everling, S., and Munoz, D. P. (2002) Contribution of the primate superior colliculus to inhibition of return. *J. Cog. Neurosci.* 14: 1256-1263.
- Armstrong, I. T., Chan, F., Riopelle, R. J., and Munoz, D. P. (2002) Control of saccades in Parkinson's disease. *Brain Cogn.* 49: 198-201.
- Munoz, D. P. and Fecteau, J. H. (2002) Vying for dominance: dynamic interactions control visual fixation and saccadic initiation in the superior colliculus. *Prog. Brain Res.* 140: 3-19.
- Munoz, D. P., LeVasseur, A. L., and Flanagan, J. R. (2002) Control of volitional and reflexive saccades in Tourette's syndrome. *Prog. Brain Res.* 140: 467-481.
- Munoz, D. P. (2002) Saccadic eye movements: overview of neural circuitry. *Prog. Brain Res.* 140: 89-96.
- Connolly, J.D., Goodale, M. A., Menon, R. S., and Munoz, D. P. (2002) Human fMRI evidence for the neural correlates of preparatory set. *Nature Neurosci* 5: 1345-1352.
- Fecteau, J. H. and Munoz, D. P. (2003) Exploring the consequences of the previous trial. *Nature Rev. Neurosci.* 4: 435-443.
- Munoz, D. P., Armstrong, I. T., Hampton, K. A., and Moore, K. D. (2003) Altered control of visual fixation and saccadic eye movements in attention-deficit hyperactivity disorder. *J. Neurophysiol.* 90: 503-514.
- Armstrong, I. T. and Munoz, D. P. (2003) Attentional blink in adults with attention-deficit hyperactivity disorder: influence of eye movements *Exp. Brain Res.* 152: 243-250.
- Armstrong, I. T. and Munoz, D. P. (2003) Inhibitory control of eye movements during oculomotor countermanding in adults with attention deficit hyperactivity disorder. *Exp. Brain Res.* 152: 444-452.
- Bell, A. H., Corneil, B. D., Munoz, D. P., and Meredith, M. A. (2003) Engagement of visual fixation suppresses sensory responsiveness and multisensory integration in the primate superior colliculus. *Eur. J. Neurosci.* 18: 2867-2873.
- Munoz, D. P. and Everling, S. (2004) Look away: using the anti-saccade task to study voluntary control of movement. *Nature Rev. Neurosci.* 5: 218-228.

- Bell, A. H., Fecteau, J. H., and Munoz, D. P. (2004) Using auditory and visual stimuli to investigate the behavioral and neuronal consequences of reflexive covert orienting. *J. Neurophysiol.* 91: 2172-2184.
- Corneil, B. D., Olivier, E., and Munoz, D. P. (2004) Visual responses on neck muscles reveal selective gating that prevents express saccades. *Neuron* 42: 831-841.
- Fecteau, J. H., Bell, A. H., and Munoz, D. P. (2004) Neural correlates of automatic and goal-driven biases in orienting spatial attention. *J. Neurophysiol.* 92: 1728-1737.
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