Patrick Bédard, Ph.D.

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Academic Positions

Assistant Professor (Research), Department of Neuroscience, Brown University (USA)   05/2011-present
Conducting research on the brain processes involved in motor skill learning and eye-hand coordination. I study these mechanisms with functional magnetic resonance imaging and psychophysics techniques from healthy individuals. I also assess how Parkinson's disease affects these processes.

Investigator (Research), Department of Neuroscience, Brown University (USA)   2008-2011

Post-doctoral Research Associate, Department of Neuroscience, Brown University (USA)   2003-2008

Teaching Assistant, School of Optometry, Université de Montréal (Canada)   2001
Responsible for the development of curriculum and primary class instruction in a fall-term course on the fundamentals of Motor control and Motor learning (KIN 6870- *Kinésiologie et Intégration Sensorielle*).

Intern, Department of Kinesiology, University of Waterloo (Canada)   2000
Conducted research to assess how we use visual inputs to grasp objects. The internship required training in a new laboratory, conducting experiments, analyzing data, and presenting the outcomes at a conference. Supervisor : Dr. Heather Carnahan.

Education

Ph.D. Kinésiologie, Université de Montréal, Canada   2003
Dissertation: "On the role of static and dynamic visual information for the control of goal directed movements". Director: Dr. Luc Proteau

M.Sc. Sciences de l'Activité Physique, Université du Québec à Trois-Rivières, Canada   1998
Thesis: "Learning to juggle as a mean to improve handwriting legibility in Dysgraphic children". Director: Dr. Claude Dugas

B.A. Psychology, Université du Québec à Trois-Rivières, Canada   1995

Publications

Im HY, **Bédard**, P, & Song JH. (2015). Encoding attentional states during visuomotor adaptation. *Journal of Vision*, 15(8), 20, 1-16. doi: 10.1167/15.8.20.

Fasoli S, **Bédard** P, Barredo J, Sanes J, and Resnik, LJ. (2015). Plasticity Associated with Learning to Use an Advanced Upper Limb Prosthetic Device: A Neuroimaging Study. Archives of Physical Medicine and Rehabilitation. doi: http://dx.doi.org/10.1016/j.apmr.2015.08.218.

Song JH and **Bédard** P. (2015). Paradoxical Benefits of Dual-Task Contexts for Visuomotor Memory. *Psychological Science*; Feb;26(2):148-58. doi: 10.1177/0956797614557868.

Bédard P and Sanes JN. (2014) Brain representations for acquiring and recalling visual-motor adaptations. *NeuroImage*. Nov 1;101:225-35; doi: 10.1016/j.neuroimage.2014.07.009.

Bédard P, Song JH. (2013). Attention modulates generalization of visuomotor adaptation. *Journal of Vision*, Oct 16;13(12).

Song JH, **Bédard** P. (2013). Allocation of attention for dissociated visual and motor goal. *Experimental Brain Research*, Apr; 226(2):209-19.

Gorrostieta C, Ombao H, **Bédard** P, and Sanes JN. (2012). Investigating brain connectivity using mixed effects vector autoregressive models. *NeuroImage*, 59(4), 3347-3355.

Bédard P and Sanes JN (2011). Basal ganglia-dependent processes in recalling learned visual-motor adaptations. *Experimental Brain Research* 209(3), 385-93.

Bédard P, Wu M, and Sanes JN. (2011). Brain activation related to combinations of gaze position, visual input, and goal-directed hand movements. *Cerebral Cortex* Jun, 21(6):1273-82.

Bédard P and Sanes JN (2009). On a basal ganglia role in learning and rehearsing visual-motor associations. *NeuroImage* Oct 1, 47(4), 1701-10.

Bédard P and Sanes JN. (2009). Gaze and hand position effects on finger-movement-related human brain activation. *Journal of Neurophysiology* 101(2), 834-42.

Bédard P, Thangaval A, and Sanes JN. (2008). Gaze influences finger movement-related and visual-related activation across the human brain. *Experimental Brain Research* 188(1): 63-75.

Bédard P and Proteau L. (2005). Movement planning of video and of manual aiming movements. *Spatial Vision* 18(3): 275-296.

Bédard P and Proteau L. (2004). On-line vs. off-line utilization of peripheral visual afferent information to ensure spatial accuracy of goal-directed movements. *Experimental Brain Research* 158(1):75-85.

Bédard P and Proteau L. (2003). On the role of peripheral visual afferent information for the control of rapid video-aiming movements. *Acta Psychologica* (Ams) 113(1): 99-117.

Bédard P and Proteau L. (2001). On the role of static and dynamic visual afferent information in goal-directed aiming movements. *Experimental Brain Research* 138(4): 419-431.

Articles under review or in Preparation

Bédard P, Chappidi M, Bataglia-Mayer A, Caminiti R, and Sanes JN. We are studying the brain correlates of performing visual-based corrections during reaching movements.

Bédard P and Sanes JN. Determining the role of the basal ganglia in sensory-motor adaptation using fMRI and individuals with Parkinson's disease.

Bédard P, Gorrostieta C, Ombao H, and Sanes JN. Human Parietal-Frontal Cortical Representations of Action Selection.

Bédard P, Dubrowski A, Proteau L, and Carnahan H. Determining how we use visual inputs to grasp objects when we look at them via peripheral vision as opposed to direct vision.

Ongoing projects

Bédard P, Batty E, Churchill T, and Sanes JN. Assessing effects of gaze orientation on directional tuning in human fronto-parietal cortex using fMRI.

Bédard P, Mathews A, and Sanes JN. Determining the neural correlates of sensory-motor transformations and the impact of decision making using EEG.

Bédard P and Song J-H. In collaboration with a colleague from the Cognitive, Linguistic and Psychological Sciences Dept. at Brown University, conducting research on how attention affects memory formation during sensory-motor adaptation. We have conducted several experiments and our results suggest that attention does not influence performance changes during learning per se, but rather affects recall and thus memory formation.

Bédard P, Walsh E, and Sanes JN. We are studying the role of GABA and glutamate in the primary motor cortex during visuomotor adaptation using Magnetic Resonance Spectroscopy (MRS).

<u>Conferences</u>

Song JH and **Bédard** P. Long-lasting paradoxical effects of attentional-states on visuomotor learning. <u>Vision Science Society</u>, St-Pete beach, Florida, USA, 2014.

Bédard P and Sanes JN. Effective connectivity changes before and after sudden and gradual visual-motor adaptation <u>Society for Neuroscience</u> Chicago, USA, 2015.

Sanes JN and **Bédard** P. Brain activity during gradual visuomotor adaptation. <u>Society for Neuroscience</u> Washington DC, USA, 2014.

Song JH and Bédard P. Long-lasting paradoxical effects of attentional-states on visuomotor memory states on visuomotor learning. <u>Society for Neuroscience,</u> San Diego, USA, 2013.

Bédard P and Song JH, Attention modulates generalization of visuomotor learning. <u>Vision Science Society,</u> Naples, USA, 2013.

Song JH and **Bédard** P. Effects of attentional states on visuomotor learning. <u>Vision Science Society</u>, Naples, USA, 2013.

Sanes JN, **Bédard** P, Caminiti R, Chappidi M, Battaglia-Mayer A. Human brain representations for online adjustments of voluntary actions. <u>Human Brain Mapping,</u> Seattle USA, 2013.

Sanes JN and **Bédard P.** Parkinson's disease effects on brain representations of learning and recalling internal models. <u>Society for Neuroscience</u> New Orleans, USA, 2012.

Bédard P, Battaglia-Mayer A, Chappidi MR, Caminiti R, and Sanes JN, Human brain representations of on-line motor control. <u>Society for Neuroscience</u> New Orleans, USA, 2012.

Bédard P, Churchill T, and Sanes JN. Directional coding of reaching in human fronto-parietal cortex and effects of gaze orientation. <u>Human Brain Mapping</u>. Québec city, Canada, 2011.

Bédard P, Churchill T, and Sanes JN. Movement directional coding in human fronto-parietal cortex: effects of gaze position. <u>Society for Neuroscience</u> Washington DC, USA, 2011.

Song J and **Bédard P**. Attentional load effects on sensory-motor adaptation. <u>Society for Neuroscience</u> Washington DC, USA, 2011.

Bédard P, Song J-H. Attentional load effects on sensory-motor adaptation. <u>Vision Sciences Society</u>, Naples, Florida, USA, 2011.

Bédard P, Thaweerattanasinp T and Sanes JN. Action selection representations in frontal and parietal cortex. <u>Society for Neuroscience</u>, San Diego, USA, 2010.

Bédard P, Thaweerattanasinp T and Sanes JN. Action selection representations in frontal and parietal cortex. <u>Human Brain Mapping</u>. Barcelona, Spain, 2010.

Bédard P, Wu M, and Sanes JN. Memory and visual interactions for combined human brain representations for gaze position and hand movements. <u>Society for Neuroscience</u>, Chicago, USA, 2009.

Bédard P, Wu M, and Sanes JN. Memory and visual interactions for combined human brain representations for gaze position and hand movements. <u>Human Brain Mapping</u>. San Francisco, USA, 2009.

Bédard P and Sanes JN. Brain representations of visuo-motor adaptation learning and retention. <u>Human Brain Mapping</u>. San Francisco, USA, 2009.

Bédard P and Sanes JN. Brain representations of visuo-motor adaptation learning and retention. <u>Society for Neuroscience</u>, Washington DC, USA, 2008.

Sanes JN and **Bédard** P. Basal ganglia contributions to short-term retention of visual-motor adaptations. <u>Society for Neuroscience</u>, Washington DC, USA, 2008.

Bédard P and Sanes JN. Combined gaze and hand representations for skeletal movements in human brain. <u>Society for Neuroscience</u>, Atlanta, USA, 2006.

Bédard P and Sanes JN. Gaze and hand centered frame of reference for finger movements in human. <u>Human Brain Mapping</u>, Florence, Italy, 2006.

Bédard P and Sanes JN. Parkinson's disease affects brain activation during visual-motor arbitrary associative learning. <u>Society for Neuroscience</u>, Washington DC, USA, 2005.

Bédard P and Sanes JN. Parkinson's disease affects brain activation during visual-motor arbitrary associative learning. <u>Human Brain Mapping</u>, Toronto, Canada, 2005.

Bédard P, Thangaval A, and Sanes JN. Integration of gaze position with finger movements in the human brain. <u>Human Brain Mapping</u>, Budapest, Hungary, 2004.

Bédard P, Thangaval A, and Sanes JN. Gaze field in human neo-cortex related to finger movement. <u>Society for Neuroscience</u>, New Orleans, USA, 2003.

Bédard P and Proteau L. Is movement planning improved by initial vision of the hand or eye movement from the starting base to the target location? <u>Société Canadienne d'Apprentissage Psycho-moteur et de Psychologie du Sport (SCAPPS)</u>, Montréal, Canada, 2001.

Bédard P, Dubrowski A, Proteau L, and Carnahan H. Grasping objects in peripheral visual field. <u>Société Canadienne d'Apprentissage Psycho-moteur et de Psychologie du Sport</u>, Waterloo, Canada, 2000.

Bédard P and Proteau L. On the role of static and dynamic visual information for the planning and control of hand movements. <u>Société Canadienne d'Apprentissage Psycho-moteur et de Psychologie du Sport</u>, Edmonton, Canada, 1999.

Mentorship and Teaching

I have mentored the work of several undergraduate students. I teach them how to design fMRI and psychophysics experiments, collect and analyze data using various softwares including Matlab, *R* project, FSL, and AFNI, and present the outcomes. In collaboration with Dr Sanes, I also supervised students research projects in the completion of honorary undergraduate thesis.

Instructor: CLPS 1580A: Visually-Guided Actions and Cognitive Processes. Brown University Dept. of Cognitive, Linguistic and Psychological Sciences; Autumn 2012

Instructor: CLPS 1580B: Visual Attention. Brown University Dept. of Cognitive, Linguistic and Psychological Sciences; Autumn 2013

Memberships

Society for Neuroscience (SFN)
Vision Science society (VSS)
Organization for Human Brain Mapping (OHBM)
Vice-President, Graduate Student Association, Dépt. de Kinésiologie, Université de Montréal

Ad hoc reviewer:

Brain, Journal of Neurophysiology, Journal of Motor Behavior, Cognitive, Affective, and Behavioral Neuroscience, PlosONE