University of Birmingham

Dr Raymond Reynolds BSc, MSc, PhD

Lecturer in Motor Control

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About

Dr Raymond Reynolds has a wide range of interests within the field of human motor control. This includes sensorimotor control of balance, reaching and tremor. His research is supported by the BBSRC.

Feedback and office hours

Office hours are Monday 2-4, although it is best to book an appointment in advance.

Qualifications

- B.Sc. Animal Physiology (University of Reading)
- M.Sc. Neuroscience (University College London)
- Ph.D. Gait adaptation and after-effects (Imperial College London)

Biography

After completing a PhD investigating postural adaptation Dr Reynolds spent 4 years at the Institute of Neurology with Professor Brian Day examining sensory guidance of limb trajectory. He joined the department in October 2007.

Teaching

Dr Reynolds currently delivers a third year module entitled Techniques in Neuroscience. This covers a range of methods including brain imaging and neural stimulation.He also contributes to the 2nd yr course, Sensation & Movement in addition to delivering a 2nd yr motor control lab, and providing a one day Masterclass for the BBSRC MIBTP programme. He previously taught musculo-skeletal anatomy.

Postgraduate supervision

Dr Reynolds currently supervises three PhD students. Enquiries from prospective candidates are welcome at any time.

Research

Research themes

Vestibular control of posture - How does the brain transform vestibular signals into appropriate responses for balance? Galvanic Vestibular Stimulation induces a sense of head movement. The resulting sway response reveals mechanisms underlying sensorimotor control of standing. This theme is covered on a recent Inside Science interview on BBC Radio 4: **http://www.bbc.co.uk/programmes/b04009cd (http://www.bbc.co.uk/programmes/b04009cd)** . Daily Mail Article on ageing balance: http://www.dailymail.co.uk/sciencetech/article-2239369/The-OAPs-undergoing-rigorous-jet-pilot-testing-elderly-suffer-falls.html

Tremor - Fourier and wavelet methods are used to examine the relationship between muscle activity and hand movement during static postures. This can distinguish between neural and mechanical origins of physiological tremor.

Neural basis of online visual control of movement **-** Target jump paradigms reveal the neural mechanisms underlying online control of reaching and stepping, both in healthy individuals and stroke patients.

Funding (as PI)

European Space Agency/BBSRC - *Effect of prolonged inactivity on vestibular control of balance (£29k; 2014-15)*

BBSRC - BB/L02103X/1 - *The sensory role of muscle for the control of balance (£321k; 2014-17)*

MRC-ARUK - PhD Scholarship (2014-17) - *Vestibular function in high-risk fallers*

BBSRC MIBTP - PhD Scholarship (2012-16) - *Sensory guidance of the upper limb*

BBSRC NI Award- BB/100579X/1 - *The effect of ageing on vestibular control of balance (£198k; 2011-13)*

BBSRC Industry Exchange Award - *Establishment of a human sensory testing facility at The University of Birmingham (£25k; 2012-13)*

Collaborators

External: Professor Jean-Sebastian Blouin (UBC); Professor Brian Day (UCL), Professr Jon Marsden (University of Plymouth), Dr Ian Loram (Manchester Metropolitan), Dr Vivian Weerdesteyn (University of Nijmegen).

Internal: Dr Martin Lakie, Dr James Fisher

Other activities

Member of Postgraduate research & Health & Safety committees.

Theme lead for Movement Rehabilitiation.

Publications

Vernooij CA, Lakie M, **Reynolds RF** (2014) The complete frequency spectrum of physiological tremor can be recreated by broad-band mechanical or electrical drive. *J Neurophysiol* (in press)

Reynolds RF, Osler CJ. (2014) Mechanisms of interpersonal sway synchrony and stability. *J R Soc Interface*. Dec 6;11(101)

Osler CJ, Tersteeg MCA, **Reynolds RF,** Loram ID. (2013) Postural threat differentially affects the feedforward and feedback components of the vestibular-evoked balance response. *Eur J Neurosci*. (in press)

Vernooij CA, **Reynolds RF,** Lakie M. (2013) A dominant role for mechanical resonance in physiological finger tremor revealed by selective minimisation of voluntary drive and movement. *J Neurophysiol*. Feb 13.

Reynolds RF, Day BL. (2012) Direct visuomotor mapping for fast visually-evoked arm movements. *Neuropsychologia*. Dec 12

Osler CJ, **Reynolds RF**. (2012) Dynamic transformation of vestibular signals for orientation. *Exp Brain Res*. Jun 28.

Reynolds RF and Osler CJ (2012). **Galvanic vestibular stimulation produces sensations of rotation consistent with activation of semicircular canal afferents (/Documents/college-les/sportex/staff-docs/ReynoldsOslerFrontiers2012.pdf)** . *Front. Neur.* **3:**104.

Osler CJ, **Reynolds RF**. (2012) **Postural reorientation does not cause the locomotor after-effect following rotary locomotion (/Documents/college-les/sportex/staff-docs/OslerReynoldsEBR2012a.pdf)** . Exp Brain Res. Jun 4.

Lakie M, Vernooij CA, Osborne TM, **Reynolds RF**. (2012) **The resonant component of human physiological hand tremor is altered by slow voluntary movements (/Documents/college-les/sportex/staff-docs/LakieetalJP2012.pdf)** . J Physiol. May 15;590(Pt 10):2471-83.

Reynolds RF. **Vertical torque responses to vestibular stimulation in standing humans (/Documents/college-les/sportex/staff-docs/Reynolds-JP2011.pdf)** . J Physiol. 2011 Aug 15;589(Pt 16):3943-53.

Reynolds RF, Lakie M. Post-movement changes in the frequency and amplitude of physiological tremor despite unchanged neural output. J Neurophys. 2010 Oct; 104(4):2020-3 **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/ReynoldsLakie_JNP2010.pdf)**

Nonnekes JH, TalelP P, de Niet M, **Reynolds RF**, Weerdesteyn V, Day BL. Deficits underlying impaired visually triggered step adjustments in mildly affected stroke patients. Neurorehabil Neural Repair. 2010 May;24(4):393-400. **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/Nonnekes_NRNR2010.pdf)**

Reynolds RF. The effect of voluntary sway control on the early and late components of the vestibular-evoked postural response. Exp Brain Res. 2010 Mar;201(2):133-9. **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/Reynolds_EBR2010.pdf)**

Reynolds RF. The ability to voluntarily control sway reflects the difficulty of the standing task. Gait Posture. 2010 Jan;31(1):78-81. **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/Reynolds_GP2010.pdf)**

Bronstein AM, Bunday KL, **Reynolds R**. What the "Broken Escalator Phenomenon" Teaches Us about Balance. Ann. N.Y. Acad. Sci. 2009; 1164: 82-88 **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/Bronstein_ANYAS2009.pdf)**

Reynolds R, Bronstein A. The moving platform after-effect reveals dissociation between what we know and how we walk. J Neural Transm. 2007;114(10):1297-303.

Reynolds RF, Day BL.Fast visuomotor processing made faster by sound. J Physiol. 2007 Sep 15;583(Pt 3):1107-15. **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/ReynoldsDay_JP2007.pdf)**

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Bunday KL, **Reynolds RF**, Kaski D, Rao M, Salman S, Bronstein AM. The effect of trial number on the emergence of the 'broken escalator' locomotor aftereffect. Exp Brain Res. 2006 Sep;174(2):270-8.

Jauregui-Renaud K, **Reynolds R**, Bronstein AM, Gresty MA. Cardio-respiratory responses evoked by transient Pnear acceleration. Aviat Space Environ Med. 2006 Feb;77(2):114-20.

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Day BL, **Reynolds RF**. Vestibular reafference shapes voluntary movement. Curr Biol. 2005 Aug 9;15(15):1390-4. **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/DayReynolds_CB2005b.pdf)**

Reynolds RF, Day BL. Rapid visuo-motor processes drive the leg regardless of balance constraints.Curr Biol. 2005 Jan 26;15(2):R48-9. **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/ReynoldsDay_CB2005a.pdf)**

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planes.Neurosci Lett. 2001 Jan 26;298(1):17-20. **pdf (http://www.download.bham.ac.uk/les/sportex/Reynolds_PDFs/JaureguiRenaud_NL2001.pdf)**