

Jonathan D. Clayden

Work address: Imaging & Biophysics Unit
UCL Institute of Child Health
30 Guilford Street
London WC1N 1EH
United Kingdom

Telephone: +44 (0)20 7905 2708
E-mail: j.clayden@ucl.ac.uk
Web site: www.flakery.org/work
Date of birth: 24 July 1981
Nationality: British

Education

- 2004–2007 **University of Edinburgh**
PhD, Neuroinformatics
Thesis: “Comparative analysis of connection and disconnection in the human brain using diffusion MRI: New methods and applications”
Supervisors: Dr Mark Bastin (Edinburgh), Dr Amos Storkey (Edinburgh), Dr David Laidlaw (Brown University, RI, USA)
- 2003–2004 **University of Edinburgh**
MSc by Research, Neuroinformatics (pass with distinction)
Thesis 1: “Recency and similarity effects in a visual probe recognition task using unfamiliar stimuli”; Thesis 2: “White matter integrity and cognition in childhood and old age”
- 1999–2002 **Pembroke College, University of Cambridge**
MA (Cantab), Computer Science (final class 2.i)

Employment

- 2009– **Institute of Child Health, University College London**
Nonclinical Lecturer in Neuroimaging and Biophysics
Role centres on coordinating and carrying out research into brain imaging methods and their clinical applications
- 2007–2009 **Institute of Child Health, University College London**
Research Fellow, Brain Imaging and Tractography Methods

Invited talks

- *Imaging connectivity: Statistical modelling and the wiring of the brain.* Berlin Workshop on Statistics and Neuroimaging, Berlin, Germany (November 2011).
- *Interfacing an existing software library to R: The example of “RNiftyReg”.* LondonR Meeting, London, UK (June 2011).
- *Starting up an independent career: A personal perspective.* UCL Neuroscience Early Career Forum, London, UK (May 2011).
- *Streamline matching in diffusion tractography.* CUBRIC, University of Cardiff, Cardiff, UK (January 2011).
- *Common factors and gender differences in normal white matter tract development.* Centre for Developmental Cognitive Neuroscience, UCL, London, UK (October 2010).

- *Recent advances in diffusion MRI*. 13th Kuopio Bio-NMR Workshop, Kuopio, Finland (December 2009).
- *Basics of diffusion MRI and DTI*. 13th Kuopio Bio-NMR Workshop, Kuopio, Finland (December 2009).
- *A shape modelling approach to tract segmentation and characterisation in groups*. University of Manchester, Manchester, UK (July 2009).
- *Optimising diffusion pulse sequences for in vivo investigation of microstructure*. UK Diffusion MRI Interest Group meeting, London, UK (June 2009).
- *Neuroinformatics at Edinburgh: A personal perspective*. EPSRC Showcase Event, The Royal Society, London, UK (February 2009).

Professional Activities

- Member and Webmaster, UK Diffusion MRI Interest Group (dMRI-UK; diffusion-mri.org.uk).
- Member, International Society for Magnetic Resonance in Medicine (ISMRM).
- Scientific Session Moderator, ISMRM 19th Scientific Meeting & Exhibition.
- Programme Committee Member, MICCAI 2010 Workshop on Computational Diffusion MRI.
- Programme Committee Member, MICCAI 2009 Workshop on Diffusion Modelling and the Fibre Cup.
- Reviewer for *NeuroImage*, *IEEE Transactions on Medical Imaging* and occasionally other journals.

Teaching & Communication

- *DTI imaging and network connectivity*. Lecture, UCL MSc in Neuroscience (2011).
- *Tractography workshop*. Workshop, UCL MSc in Advanced Neuroimaging (2009–2011).
- *Multimodal MRI workshop*. Workshop, UCL MSc in Advanced Neuroimaging (2009–2011).
- *Introducing tractography*. Lecture, University of Edinburgh MSc in Neuroscience (2005, 2006).
- Science communication experience as part of an Edinburgh Medical Physics student initiative which had contact with some 8000 schoolchildren and members of the public over two years. This initiative was partly funded by an EPSRC Partnership for Public Engagement grant.

Grants

- *Improving epilepsy surgery in childhood using functional magnetic resonance imaging and electroencephalography*. Co-Investigator (PI: D. Carmichael). Action Medical Research; value £190,057; reference SP4646.
- *Hypoxia/ischaemia and patterns of neuropathology associated with memory impairment: From infancy through adolescence*. Co-Investigator (PI: F. Vargha-Khadem). MRC Programme Grant; value £1,433,752; reference G1002276.

Publications

JOURNAL PAPERS

1. E.A. Webb, M.A. O'Reilly, **J.D. Clayden**, K.K. Seunarine, W.K. Chong, N. Dale, A. Salt, C.A. Clark & M.T. Dattani (in press). Isolated growth hormone deficiency is associated with neuroanatomical abnormalities that correlate with cognitive and motor abnormalities. To appear in *Brain*.
2. **J.D. Clayden**, S. Jentschke, M. Muñoz, J.M. Cooper, M.J. Chadwick, T. Banks, C.A. Clark & F. Vargha-Khadem (in press). Normative development of white matter tracts: Similarities and differences in relation to age, gender and intelligence. To appear in *Cerebral Cortex*.
3. J.M. Wardlaw, M.E. Bastin, M.C. Valdés Hernández, S. Muñoz Maniega, N.A. Royle, Z. Morris, **J.D. Clayden**, E.M. Sandeman, E. Eadie, C. Murray, J.M. Starr & I.J. Deary (in press). Brain ageing, cognition in youth and old age, and vascular disease in the Lothian Birth Cohort 1936: Rationale, design and methodology of the imaging protocol. To appear in *International Journal of Stroke*.
4. M. Cutajar, **J.D. Clayden**, C.A. Clark & I. Gordon (in press). Test-retest reliability and repeatability of renal diffusion tensor MRI in healthy subjects. To appear in *European Journal of Radiology*.
5. **J.D. Clayden**, S. Muñoz Maniega, A.J. Storkey, M.D. King, M.E. Bastin & C.A. Clark (2011). TractoR: Magnetic resonance imaging and tractography with R. *Journal of Statistical Software* **44**(8):1–18.
6. K. Tabelow, **J.D. Clayden**, P. Lafaye de Micheaux, J. Polzehl, V.J. Schmid & B.J. Whitcher (2011). Image analysis and statistical inference in neuroimaging with R. *NeuroImage* **55**(4):1686–1693.
7. L. Penke, S. Muñoz Maniega, C. Murray, A.J. Gow, M.C. Valdés Hernández, **J.D. Clayden**, J.M. Starr, J.M. Wardlaw, M.E. Bastin & I.J. Deary (2010). A general factor of brain white matter integrity predicts information processing speed in healthy older people. *The Journal of Neuroscience* **30**(22):7569–7574.
8. M.E. Bastin, S. Muñoz Maniega, K.J. Ferguson, L.J. Brown, J.M. Wardlaw, A.M. MacLulich & **J.D. Clayden** (2010). Quantifying the effects of normal ageing on white matter structure using unsupervised tract shape modelling. *NeuroImage* **51**(1):1–10.
9. L. Penke, S. Muñoz Maniega, L.M. Houlihan, C. Murray, A.J. Gow, **J.D. Clayden**, M.E. Bastin, J.M. Wardlaw & I.J. Deary (2010). White matter integrity in the splenium of the corpus callosum is related to successful cognitive aging and partly mediates the protective effect of an ancestral polymorphism in *ADRB2*. *Behavior Genetics* **40**(2):146–156.
10. **J.D. Clayden**, A.J. Storkey, S. Muñoz Maniega & M.E. Bastin (2009). Reproducibility of tract segmentation between sessions using an unsupervised modelling-based approach. *NeuroImage* **45**(2):377–385.
11. E. Sprooten, G.K.S. Lymer, S. Muñoz Maniega, J. McKirdy, **J.D. Clayden**, M.E. Bastin, D.J. Porteous, E.C. Johnstone, S.M. Lawrie, J. Hall & A.M. McIntosh (2009). The relationship of anterior thalamic radiation integrity to psychosis risk associated neuregulin-1 variants. *Molecular Psychiatry* **14**(3):237–238.
12. M.E. Bastin, **J.D. Clayden**, A. Pattie, I.F. Gerrish, J.M. Wardlaw & I.J. Deary (2009). Diffusion tensor and magnetization transfer MRI measurements of periventricular white matter hyperintensities in old age. *Neurobiology of Aging* **30**(1):125–136.
13. A.M. McIntosh, S. Muñoz Maniega, G.K.S. Lymer, J. McKirdy, J. Hall, J.E.D. Sussmann,

- M.E. Bastin, **J.D. Clayden**, E.C. Johnstone & S.M. Lawrie (2008). White matter tractography in bipolar disorder and schizophrenia. *Biological Psychiatry* **64**(12):1088–1092.
14. M.E. Bastin, J.P. Piątkowski, A.J. Storkey, L.J. Brown, A.M. MacLulich & **J.D. Clayden** (2008). Tract shape modelling provides evidence of topological change in corpus callosum genu during normal ageing. *NeuroImage* **43**(1):20–28.
 15. **J.D. Clayden**, A.J. Storkey & M.E. Bastin (2007). A probabilistic model-based approach to consistent white matter tract segmentation. *IEEE Transactions on Medical Imaging* **26**(11):1555–1561.
 16. **J.D. Clayden**, M.E. Bastin & A.J. Storkey (2006). Improved segmentation reproducibility in group tractography using a quantitative tract similarity measure. *NeuroImage* **33**(2):482–492.
 17. I.J. Deary, M.E. Bastin, A. Pattie, **J.D. Clayden**, L.J. Whalley, J.M. Starr & J.M. Wardlaw (2006). White matter integrity and cognition in childhood and old age. *Neurology* **66**(4):505–512.

FULL LENGTH CONFERENCE PAPERS

1. **J.D. Clayden**, M.D. King & C.A. Clark (2009). Shape modelling for tract selection. In G.-Z. Yang, D.J. Hawkes, D. Rueckert, A. Noble & C. Taylor (eds), *Proceedings of the 12th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*. *Lecture Notes in Computer Science*, vol. 5762, pp. 150–157. Springer-Verlag.
2. **J.D. Clayden**, Z. Nagy, M.G. Hall, C.A. Clark & D.C. Alexander (2009). Active imaging with dual spin-echo diffusion MRI. In J.L. Prince, D.L. Pham & K.J. Myers (eds), *Proceedings of the 21st International Conference on Information Processing in Medical Imaging (IPMI)*. *Lecture Notes in Computer Science*, vol. 5636, pp. 264–275. Springer-Verlag.

PEER-REVIEWED CONFERENCE ABSTRACTS

1. **J.D. Clayden**, P.W. Hales & C.A. Clark (2011). A Bayesian Markov chain Monte Carlo approach to estimating the IVIM diffusion–perfusion model. In *Proceedings of the Annual Meeting of the ISMRM British Chapter*, p. P11.
2. C.S. Parker, C.A. Clark & **J.D. Clayden** (2011). Reproducibility of whole-brain structural connectivity networks. In *Proceedings of the Annual Meeting of the ISMRM British Chapter*, p. P25.
3. M. Grech-Sollars, D. Saunders, K. Phipps, **J.D. Clayden** & C.A. Clark (2011). Survival analysis for apparent diffusion coefficient measures in children with embryonal brain tumours. In *Proceedings of the Annual Meeting of the ISMRM British Chapter*, p. P50.
4. **J.D. Clayden** (2011). Robust and efficient white matter analysis using tract shape modelling and principal components analysis. In *Proceedings of the ISMRM 19th Scientific Meeting & Exhibition*, p. 1934.
5. E. A. Webb, M.A. O'Reilly, **J.D. Clayden**, K.K. Seunarine, T. Banks, W. Chong, N. Dale, A. Salt, M.T. Dattani & C. A. Clark (2011). Neuroanatomical associates of the cognitive and motor abnormalities found in children with Isolated Growth Hormone Deficiency. In *Proceedings of the ISMRM 19th Scientific Meeting & Exhibition*, p. 2485.
6. K. K. Seunarine, **J.D. Clayden**, S. Jentschke, M. Muñoz, J. Cooper, M.J. Chadwick, T. Banks, F. Vargha-Khadem & C. A. Clark (2011). Sexual dimorphism in white matter development in pre-adolescence: A tract based spatial statistics study. In *Proceedings of the ISMRM 19th Scientific Meeting & Exhibition*, p. 2001.

7. E.A. Webb, M.A. O'Reilly, **J.D. Clayden**, K.K. Seunarine, N. Dale, A. Salt, C.A. Clark & M.T. Dattani (2010). Diffusion tensor imaging reveals specific white matter abnormalities in children with Isolated Growth Hormone Deficiency. In *Proceedings of the 49th Annual Meeting of the European Society for Paediatric Endocrinology (ESPE)*.
8. K. Tabelow, **J.D. Clayden**, P. Lafaye de Micheaux, J. Polzehl, V.J. Schmid & B.J. Whitcher (2010). Image analysis and statistical inference in neuroimaging with R. In *Proceedings of the 16th Annual Meeting of the Organization for Human Brain Mapping (OHBM)*.
9. **J.D. Clayden**, S. Jentschke, M. Muñoz, J. Cooper, T. Banks, F. Vargha-Khadem & C.A. Clark (2010). Gender differences in the rate of white matter microstructural development during late childhood and adolescence. In *Proceedings of the ISMRM–ESMRMB Joint Annual Meeting*, p. 2035.
10. **J.D. Clayden** & C.A. Clark (2010). On the importance of appropriate fibre population selection in diffusion tractography. In *Proceedings of the ISMRM–ESMRMB Joint Annual Meeting*, p. 1679.
11. M. Cutajar, S.D. Marks, **J.D. Clayden**, C.A. Clark & I. Gordon (2010). Evaluation of the feasibility and reproducibility of renal DTI MRI in healthy volunteers. In *Proceedings of the ISMRM–ESMRMB Joint Annual Meeting*, p. 4692.
12. S. Muñoz Maniega, L. Penke, M.C. Valdés Hernández, C. Murray, N.A. Royle, A.J. Gow, **J.D. Clayden**, J.M. Starr, M.E. Bastin, I.J. Deary & J.M. Wardlaw (2010). A multi-parametric study of white matter integrity and cognition in old age. In *Proceedings of the ISMRM–ESMRMB Joint Annual Meeting*, p. 1998.
13. C.S. Hill, **J.D. Clayden**, N. Kitchen, J. Bull, W. Harkness & C.A. Clark (2009). A feasibility study of neighbourhood tractography in the presence of paediatric brain tumours. In *Proceedings of the Autumn Meeting of the Society of British Neurological Surgeons*.
14. **J.D. Clayden**, C.J. Riney, J. Cooper, M. Muñoz & C.A. Clark (2009). Segmentation goodness-of-fit can modulate age effects on anisotropy. In *Proceedings of the Annual Meeting of the ISMRM British Chapter*, p. P33.
15. E.A. Webb, M.A. O'Reilly, K.K. Seunarine, **J.D. Clayden**, N. Dale, A. Salt, C.A. Clark & M.T. Dattani (2009). Parahippocampal aberrations in children with growth hormone deficiency: A diffusion tensor imaging study. In *Proceedings of the Annual Meeting of the ISMRM British Chapter*, p. O22.
16. **J.D. Clayden**, C.J. Riney, J. Cooper, M. Muñoz & C.A. Clark (2009). Segmentation and characterisation of white matter tracts in late childhood and adolescence. In *Proceedings of the ISMRM 17th Scientific Meeting & Exhibition*, p. 1454.
17. **J.D. Clayden**, Z. Nagy, D.C. Alexander & C.A. Clark (2009). Axon radius estimation using optimised Stejskal–Tanner and dual spin-echo sequences at modest SNR. In *Proceedings of the ISMRM 17th Scientific Meeting & Exhibition*, p. 1397.
18. **J.D. Clayden** & C.A. Clark (2009). Model-based streamline rejection for probabilistic tractography. In *Proceedings of the ISMRM 17th Scientific Meeting & Exhibition*, p. 1440.
19. M.E. Bastin, S. Muñoz Maniega, **J.D. Clayden**, A.J. Storkey, L.J. Brown & A.M. MacLulich (2009). Comparison of neighborhood tractography methods for segmenting white matter tracts in the aging brain. In *Proceedings of the ISMRM 17th Scientific Meeting & Exhibition*, p. 1042.
20. S. Muñoz Maniega, L. Penke, **J.D. Clayden**, C. Murray, M.E. Bastin, A.J. Gow, J.M. Wardlaw & I.J. Deary (2009). Tract-specific white matter integrity and cognitive ability in youth and old age. In *Proceedings of the ISMRM 17th Scientific Meeting & Exhibition*, p. 3236.
21. **J.D. Clayden**, A.J. Storkey & M.E. Bastin (2008). A comparison of seeding strategies

- for group tractography. In *Proceedings of the ISMRM 16th Scientific Meeting & Exhibition*, p. 1839.
22. **J.D. Clayden**, A.J. Storkey & M.E. Bastin (2008). Probabilistic combination of tractography data from multiple seed points for white matter segmentation. In *Proceedings of the ISMRM 16th Scientific Meeting & Exhibition*, p. 1840.
 23. S. Muñoz Maniega, M.E. Bastin, A.M. McIntosh, S.M. Lawrie & **J.D. Clayden** (2008). Atlas-based reference tracts improve automatic white matter segmentation with neighbourhood tractography. In *Proceedings of the ISMRM 16th Scientific Meeting & Exhibition*, p. 3318.
 24. M.E. Bastin, **J.D. Clayden**, J.P. Piątkowski, A.J. Storkey, L.J. Brown & A.M. MacLulich (2008). Robust segmentation of white matter tracts in the aging brain. In *Proceedings of the ISMRM 16th Scientific Meeting & Exhibition*, p. 2092.
 25. **J.D. Clayden**, A.J. Storkey & M.E. Bastin (2007). A probabilistic model-based approach to consistent white matter tract segmentation. In *Proceedings of the ISMRM–ESMRMB Joint Annual Meeting*, p. 78.
 26. **J.D. Clayden**, S. Zhang, S. Correia & D.H. Laidlaw (2007). Fine-grained comparison of anisotropy differences between groups of white matter tracts. In *Proceedings of the ISMRM–ESMRMB Joint Annual Meeting*, p. 82.
 27. M.E. Bastin, **J.D. Clayden**, A. Pattie, I.F. Gerrish, J.M. Wardlaw & I.J. Deary (2007). DTI and MTI parameters correlate in periventricular white matter hyperintensities in old age. In *Proceedings of the ISMRM–ESMRMB Joint Annual Meeting*, p. 2160.
 28. **J.D. Clayden**, M.E. Bastin & A.J. Storkey (2006). Neighbourhood tractography: a new approach to seed point placement for group fibre tracking. In *Proceedings of the British Chapter of the ISMRM*, p. P34.
 29. **J.D. Clayden**, M.E. Bastin & A.J. Storkey (2006). Automated assessment of tract similarity in group diffusion MRI data. In *Proceedings of the ISMRM 14th Scientific Meeting & Exhibition*, p. 2742.
 30. **J.D. Clayden**, D.K.S. Marjoram, M.E. Bastin, E.C. Johnstone & S.M. Lawrie (2005). Towards an automated method for white matter integrity comparison between populations. In *Proceedings of the ESMRMB 22nd Annual Meeting*, p. 508.
 31. I.J. Deary, M.E. Bastin, A. Pattie, **J.D. Clayden** & J.M. Wardlaw (2005). Cognitive ageing and white matter integrity: a diffusion tensor and magnetisation transfer MRI study. In *Proceedings of the ISMRM 13th Scientific Meeting & Exhibition*.
 32. I.J. Deary, M.E. Bastin, A. Pattie, **J.D. Clayden**, J.M. Starr & J.M. Wardlaw (2005). White matter integrity and cognition in childhood and old age: a diffusion tensor MRI study. *Methods for Quantitative MRI of Human Brain*. ISMRM Workshop, Lake Louise, Canada.