

# David A. Knowles

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**DOB:** 04/12/1984

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## Publications

- 2011 David A. Knowles, Tom Minka. **Non-conjugate Variational Message Passing for Multinomial and Binary regression.** To appear: Advances in Neural Information Processing Systems (NIPS 2011)
- 2011 Mehregan Movassagh, Mun-Kit Choy, David A. Knowles, Lina Cordeddu, Syed Haider, Thomas Down, Lee Siggins, Ana Vujic, Ilenia Simeoni, Chris Penkett, Martin Goddard, Pietro Lio, Martin Bennett, Roger Foo.  
**Distinct epigenomic features in human cardiomyopathy.**  
To appear: Circulation, American Heart Association.
- 2011 David A. Knowles, Zoubin Ghahramani. **Pitman-Yor Diffusion Trees.** Conference on Uncertainty in Artificial Intelligence (UAI 2011).
- 2011 David Knowles, Jurgen Van Gael, and Zoubin Ghahramani.  
**Message Passing Algorithms for the Dirichlet Diffusion Tree.**  
Conference on Artificial Intelligence and Statistics (AISTATS 2011)
- 2011 Cornelia Schone, Anne Venner, David Knowles, Mahesh M Karnani, Denis Burdakov.  
**Dichotomous cellular properties of mouse orexin/hypocretin neurons.**  
The Journal of Physiology
- 2011 David Knowles and Zoubin Ghahramani. **Nonparametric Bayesian Sparse Factor Models with application to Gene Expression modeling.** In press: Annals of Applied Statistics.
- 2010 Daniel Glass, Leopold Parts, David Knowles, Abraham Aviv, and Tim D. Spector.  
**No Correlation Between Childhood Maltreatment and Telomere Length.**  
In Biol Psychiatry. 2010 September 15; 68(6): Pages 21-22
- 2010 David Knowles, Leopold Parts, Daniel Glass and John M. Winn. **Modeling skin and ageing phenotypes using latent variable models in Infer.NET.** Poster presented at: Predictive Models in Personalized Medicine Workshop, NIPS 2010.
- 2009 Finale Doshi, David Knowles, Shakir Mohamed and Zoubin Ghahramani.  
**Large Scale Non-parametric Inference: Data Parallelisation in the Indian Buffet Process.** In NIPS 2009, 7-12 December 2009, Vancouver, BC, Canada.
- 2009 David Knowles and Susan Holmes. **Statistical tools for ultra-deep pyrosequencing of fast evolving viruses.** Presented at: Computational Biology Workshop, NIPS 2009.
- 2007 David Knowles and Zoubin Ghahramani. **Infinite Sparse Factor Analysis and Infinite Independent Components Analysis.** In 7th International Conference on Independent Component Analysis and Signal Separation (ICA 2007).

## Academic activities

- 2010 Secretary of the Cambridge University Statistics Clinic.
- 2011 Reviewer for IJCAI, NIPS, AISTATS and JCGS.
- 2010 Reviewer for NIPS, ICML and AISTATS.

## Research

- 2009- **Extending Infer.NET.** Microsoft Research Cambridge external contractor. Joint work with John Winn, Tom Minka and John Guiver.
- 2009 **Non-conjugate Variational Message Passing.** Microsoft Research Cambridge Internship Program. Supervisor: Tom Minka.

David Knowles CV cont.

- 2008 **Statistical tools for ultra-deep pyrosequencing of fast evolving viruses.** Individual Project, MSc Bioinformatics and Systems Biology, Imperial College London. Supervisor: Professor Susan Holmes, Stanford University
- 2008 **SBML-ABC: a package for data simulation, parameter inference and model selection.** Group Project, MSc Bioinformatics and Systems Biology, Imperial College London. Supervisor: Professor Michael Stumpf
- 2007 **An infinite non-parametric extension to Independent Components Analysis.** MEng Thesis, Machine Learning Group, Cambridge University Engineering Department. Supervisor: Professor Zoubin Ghahramani. Presented at the 7th International Conference on Independent Component Analysis and Signal Separation.
- 2006 **A real-time dynamic path-planning algorithm for the DARPA Urban Challenge.** Summer Undergraduate Research Fellowship, California Institute of Technology. Supervisor: Professor Richard Murray.

## Education

- 2009 **Part III Mathematics Tripos: Statistical Theory, 92%**
- 2008- **PhD Candidate, Machine Learning Group, Cambridge University Engineering Department**
- 2007-2008 **MSc Bioinformatics and Systems Biology, Imperial College London – Distinction**
- 2003-2007 **St. John's College, University of Cambridge**
- 2007 **Part II – MEng Engineering**
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| <b>Part IIB – Distinction 86% (2007)</b>                           | <b>Part IIA – First Class 83% (2006)</b> |
| <b>Project:</b> Non-parametric Independent Components Analysis 85% | Fluid Mechanics (double module) 78%      |
| <b>Modules:</b> Statistical pattern processing 95%                 | Advanced thermodynamics 85%              |
| Computer vision and robotics 82%                                   | Machine design – tribology 92%           |
| Machine learning 98%   | Vibration 85%                            |
| Non-linear and predictive control 92%                              | Business economics 63%                   |
| Signal detection and estimation 65%                                | Signals and systems 92%                  |
| Digital filters and spectrum estimation 93%                        | Systems and control 88%                  |
| Complex analysis and optimization 88%                              | Signal and pattern processing 90%        |
| Stochastic processes 87%   | PDEs and variational methods 92%         |
|  | Coursework 96%                           |
- 2005 **Part I – Natural Sciences**
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|-------------------------------------|-------------------------------------|
| <b>Part IB - First Class (2005)</b> | <b>Part IA - First Class (2004)</b> |
| Mathematics: 84.1%                  | Mathematics: 92.5%                  |
| Advanced Physics: 88.9%             | Physics: 85.8%                      |
| Physics: 82.0%                      | Chemistry: 71.3%                    |
|                                     | Biology of Cells: 76.5%             |
- 1997-2003 **Poole Grammar School**
- Step Papers** Mathematics 1 & 2 S (Outstanding)
- A2 Exams** 5 A's in Double Maths, Physics, Chemistry and General Studies
- AS Exams** 2 A's in French, Critical thinking
- GCSE** 11 A\* grades including Maths and English

## Work Experience

- 2005 **UBS Investment Bank, London - Telecoms Equity Research intern (10 weeks)**  
Developed a financial model of Belgacom, used in an official report. Used data from national regulators to research pricing trends across Europe. *Declined offer.*

David Knowles CV cont.

2004 **Data Connection Limited, London - Software Engineer intern (9 weeks)**

Developed an automatic Live Verification system using Unix shell scripts to test new builds of the product software as part of the MetaSwitch System Test team.

## Awards

- St John's College USC Scholarships and Wright Prizes (2004, 2005, 2006 and 2007)
- 2008 Roger Needham Scholarship from Wolfson College, funded by Microsoft Research
- 2007 Charles Lamb University prize for first place in Information Engineering  
Sir Joseph Larmor Silver Plate for "*undergraduates adjudged to be the most worthy for intellectual qualifications or moral conduct and practical activities*"  
Three other college prizes (Cargill, Cunningham and College prizes)
- 2005 5<sup>th</sup> highest tripos result out of six hundred Natural Scientists  
Earle Year Prize for top 4 students across all subjects at St. John's  
Hollinshead-Howles Prize for top Natural Scientist at my college  
BP Prize for Advanced Physics
- 2004 9<sup>th</sup> highest Natural Sciences tripos result  
Gaskell Year Prize and Hollinshead-Howles Prize for Part IA
- 2003 Top 50 nationally in Royal Society of Chemistry Olympiad
- 2001 Top 50 nationally in Mathematics Olympiad

## Activities and Interests

- 2011 Wolfson College Boat Club M1
- 2007 Cambridge University Lacrosse Half Blue
- 2006 St John's College Tennis Captain
- 2005 Employment Officer on St. John's May Ball Committee
- 2004 St. John's College JCR Committee Secretary  
Cambridge University 2<sup>nd</sup> Ski Team
- 2003 Duke of Edinburgh Gold Award
- 2002 Head Prefect

## Additional Skills

**Languages:** Conversational spoken and written French (AS level).

**Computing skills:** Expert in C#, C++, Matlab, R, Python. Comfortable using C, Unix shell scripts, Perl, PHP, MySQL, Pascal, HTML, JavaScript, Scheme.