

## Jukka-Pekka Onnela, D.Sc.

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Jukka-Pekka “JP” Onnela; Harvard Medical School; 180 Longwood Avenue; Boston; MA 02115

### Education

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- 2006 Doctor of Science in Computational Science  
Helsinki University of Technology (HUT), Finland  
Dissertation: *Complex networks in the study of financial and social systems*  
Minor: Systems Analysis / Operations Research
- 2002 Master of Science in Computational Science  
Helsinki University of Technology, Finland  
Minor: Strategy and International Business
- 1995 International Baccalaureate (IB)  
United World College of the Atlantic, United Kingdom

### Positions

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- 2009 - present Postdoctoral Research Fellow, Harvard Medical School, Harvard University
- 2008 - 2009 Fulbright Visiting Scholar, Harvard Kennedy School, Harvard University
- 2006 - 2008 Research Fellow, Department of Physics, Oxford University
- 2006 - 2008 Research Fellow, Saïd Business School, Oxford University
- 2003 - 2006 Researcher, Helsinki University of Technology, Finland
- 2001 - 2002 Research assistant, Helsinki University of Technology, Finland

### Affiliations

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- 2009 - 2011 Associate Fellow, CABDyN Complexity Center, Oxford University
- 2007 - 2011 Associate Fellow, Institute for Science, Innovation, and Society, Oxford University
- 2006 - 2008 Wolfson College, Oxford University

### Honors & Awards

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- 2010 Plenary Speaker, Networks for Cross-Disciplinary Applications, Zaragoza, Spain
- 2008 Plenary Speaker, Network Science 2008, Norwich, UK
- 2008 Journal of Peace Research, Article of the Year Award, paper A16
- 2007 Fulbright Visiting Scholar, Harvard University, 2008 - 2009
- 2007 Dissertation of the Year Award, 2006, HUT (ranking 1/158)
- 2006 Doctoral Dissertation awarded with grade *Pass with Distinction* (highest)
- 2006 Excellence in Teaching Award, HUT
- 2006 Best Paper Award, European Conference on Complex Systems
- 2006 Award for obtaining D.Sc. under the age of 30, HUT
- 2005 Excellence in Teaching Award, HUT
- 2005 Award for rapid completion of doctoral coursework, HUT
- 2004 Excellence in Teaching Award, HUT
- 2002 Master’s Thesis awarded with grade *Excellent* (highest)
- 1993 Atlantic College Scholarship, 93-95, Finnish Cultural Fund (1-3 awarded nationally per annum)

### Grants

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- 2006 Support for completing doctoral dissertation, Finnish Foundation for Technology Promotion
- 2004 Scholarship, Finnish Academy of Science and Letters, Väisälä Foundation
- 2004 Exchange Visit Grant, European Science Foundation
- 2002 Research stipend, 2003-2005, Computational Methods of Information Technology (Finnish university consortium)
- 2001 Exchange Visit Grant, European Science Foundation

## Published articles

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- A25 **JP Onnela** and F. Reed-Tsochas, The spontaneous emergence of social influence in online systems, *PNAS* **107**, 18375 - 18380 (2010).
- A24 P. J. Mucha, T. Richardson, K. Macon, M. A. Porter, and **JP Onnela**, Community structure in time-dependent, multiscale, and multiplex networks, *Science* **328**, 876 - 878 (2010).
- A23 M. Beguerisse-Díaz, M. A. Porter, and **JP Onnela**, Competition for popularity in catalog networks, *Chaos* **20**, 043101 (2010).
- A22 R. Toivonen, L. Kovanen, M. Kivelä, **JP Onnela**, J. Saramäki, and K. Kaski, A comparative study of stochastic algorithmic models for social networks, *Social Networks* **31**, 240-254 (2009).
- A21 M. A. Porter, **JP Onnela**, and P. J. Mucha, Communities in networks, *Notices of the American Mathematical Society* **56**, 1082-1097, 1164-1166 (2009).
- A20 D. M. D. Smith, **JP Onnela**, and N. S. Jones, Master-equation analysis of accelerating networks, *Physical Review E* **79**, 056101 (2009).
- A19 **JP Onnela**, N. F. Johnson, S. Gourley, G. Reinert, and M. Spagat, Sampling bias due to structural heterogeneity and limited internal diffusion, *Europhysics Letters* **85**, 28001 (2009).
- A18 J. M. Kumpula, **JP Onnela**, J. Saramäki, J. Kertész, and K. Kaski, Model of community emergence in weighted social networks, *Computer Physics Communications* **180**, 517-522 (2009).
- A17 **JP Onnela**, J. Töyli, and K. Kaski, Decimalization and asset returns, *Physica A* **388**, 441-454 (2009).
- A16 N. F. Johnson, M. Spagat, S. Gourley, **JP Onnela**, and G. Reinert, Bias in epidemiological studies of conflict mortality, *Journal of Peace Research* **45**, 5, 653-663 (2008).
- A15 D. M. D. Smith, C. F. Lee, **JP Onnela** and N. F. Johnson, Link-space formalism for network analysis, *Physical Review E* **77**, 036112 (2008).
- A14 J. M. Kumpula, **JP Onnela**, J. Saramäki, K. Kaski, and J. Kertész, Emergence of communities in weighted networks, *Physical Review Letters* **99**, 228701 (2007).
- A13 **JP Onnela**, J. Saramäki, J. Hyvönen, G. Szabó, D. Lazer, K. Kaski, J. Kertész, and A.-L. Barabási, Structure and tie strengths in mobile communication networks, *PNAS* **104**, 7332-7336 (2007).
- A12 **JP Onnela**, J. Saramäki, J. Hyvönen, G. Szabó, M. Argollo de Menezes, Kimmo Kaski, A.-L. Barabási, and J. Kertész, Analysis of a large-scale weighted network of one-to-one human communication, *New Journal of Physics* **9**, 179 (2007).
- A11 D. M. D. Smith, **JP Onnela**, and N. F. Johnson, Accelerating networks, *New Journal of Physics*, **9**, 181 (2007).
- A10 T. Heimo, J. Saramäki, **JP Onnela**, and K. Kaski, Spectral and network methods in the analysis of correlation matrices of stock returns, *Physica A* **383**, 147-151 (2007).
- A9 J. Saramäki, M. Kivelä, **JP Onnela**, K. Kaski, and J. Kertész, Generalizations of the clustering coefficient to weighted complex networks, *Physical Review E*, **75** 027105 (2007).
- A8 G. Tibély, **JP Onnela**, J. Saramäki, K. Kaski, and J. Kertész, Spectrum, intensity and coherence in weighted networks of a financial market, *Physica A* **370**, 145-150 (2006).
- A7 R. Toivonen, **JP Onnela**, J. Saramäki, J. Hyvönen, and K. Kaski, Model for social networks, *Physica A* **371**, 851 (2006).
- A6 **JP Onnela**, J. Saramäki, J. Kertész, and K. Kaski, Intensity and coherence of motifs in weighted complex networks, *Physical Review E* **71**, 065103 (2005).
- A5 **JP Onnela**, K. Kaski, and J. Kertész, Clustering and information in correlation based financial networks, *European Physical Journal B* **38**, 353-362 (2004).
- A4 **JP Onnela**, A. Chakraborti, K. Kaski, J. Kertész, and A. Kanto, Asset trees and asset graphs in financial markets, *Physica Scripta* **106**, 48-54 (2003).
- A3 **JP Onnela**, A. Chakraborti, K. Kaski, J. Kertész, and A. Kanto, Dynamics of market correlations: Taxonomy and portfolio analysis, *Physical Review E* **68**, 056110 (2003).
- A2 **JP Onnela**, A. Chakraborti, K. Kaski, and J. Kertész, Dynamic asset trees and Black Monday, *Physica A* **324/1-2**, 247-252 (2003).

- A1 **JP Onnela**, A. Chakraborti, K. Kaski, and J. Kertész, Dynamic asset trees and portfolio analysis, *European Physical Journal B* **30**, 285-288 (2002).

## Submitted manuscripts

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- 1 **JP Onnela**, D. J. Fenn, S. Reid, M. A. Porter, P. J. Mucha, M. D. Fricker, and N. S. Jones, A taxonomy of networks. Preprint: arXiv: physics/1006.5731.
- 2 M. Barnett, N.A. Christakis, A.J. O'Malley, **JP Onnela**, N.L. Keating, and B. Landon, Physician networks are associated with the cost and intensity of care in US hospitals.
- 3 D. M. D. Smith, **JP Onnela**, C. F. Lee, M. Fricker, and N. F. Johnson, Network automata and the functional dynamic network framework. Preprint: arXiv: physics/0701307.
- 4 **JP Onnela**, S. Arbesman, A. L. Barabasi, N. A. Christakis, Geographic constraints on social network groups. Preprint: arXiv: physics/1011.4859.
- 5 **JP Onnela**, B. Waber, A. Pentland, S. Schnorf, D. Lazer, Situational context and gender-based differences in interaction style.
- 6 A. Mislove, S. Lehmann, Y.-Y. Ahn, **JP Onnela**, J. N. Rosenquist, Understanding the demographics of Twitter users.

## Conference proceedings

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- C4 R. Toivonen, J. M. Kumpula, J. Saramäki, **JP Onnela**, J. Kertész, and K. Kaski, The role of edge weights in social networks: modelling structure and dynamics, in J. Kertesz et al (eds.), Proceedings of SPIE: Noise and Stochastics in Complex Systems and Finance, Proc. of SPIE **6601**, 660110 (2007).
- C3 **JP Onnela**, J. Saramäki, J. Kertész, and K. Kaski, Financial market - a network perspective in: H. Takayasu (Ed.), *Practical Fruits of Econophysics, Nikkei Econophysics III Proceedings*, Springer, Tokyo, 302 (2006).
- C2 J. Saramäki, **JP Onnela**, J. Kertész, and K. Kaski, Characterizing motifs in weighted complex networks in: J.F.F. Mendes, et al. (Eds.), *Science of Complex Networks - AIP Conference Proceedings* **776**, 108 (2005).
- C1 **JP Onnela**, K. Kaski, and J. Kertész, Financial market – a network of capital flows, *InterJournal Complex Systems*, 936 (5/2004).

## Theses

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- T2 **JP Onnela**, *Complex networks in the study of financial and social systems*, Laboratory of Computational Engineering, Helsinki University of Technology, Finland (2006).
- T1 **JP Onnela**, *Taxonomy of Financial Assets*, Laboratory of Computational Engineering, Helsinki University of Technology, Finland (2002).

## Popular science

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- P1 J. Saramäki, **JP Onnela**, K. Kaski, Kompleksisten verkostojen fysiikkaa (“Physics of complex networks”, in Finnish), *Arkhimedes* **1** (2007).

## Media coverage

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- M23 “Tipping Point for Apps on Facebook”, *New York Times*, October 24, 2010.
- M22 “Networks: Online peer-pressure threshold”, *Nature*, October 14, 2010.
- M21 “Virtual lemmings”, *Economist blog*, October 13, 2010.

- M20 “Herding instinct ‘seen on Facebook’ ”, *Press Association*, October 11, 2010.
- M19 “Facebook app downloads show unique ‘bandwagon effect’ ”, BBC, 12 October, 2010.
- M18 Twitter mood: CBS News, July 23, 2010; Fox News, July 28, 2010.
- M17 “National Mood, Plotted on Twitter”, *New York Times*, July 26, 2010.
- M16 “Twitter Used To Gauge The Nation’s Mood”, *Wall Street Journal*, July 24, 2010.
- M15 “America: Are you Happy?” BBC, July 23, 2010.
- M14 “Thursday: Twitter’s Angriest Day”, *Time Magazine*, July 22, 2010.
- M13 “Happy People: Researchers Pinpoint Smiles (And Frowns) Using Twitter”, NPR, July 23, 2010.
- M12 “Social networks: The great tipping point test”, *New Scientist*, July 26, 2010.
- M11 “New mathematical method may help tame big data”, *PhysOrg.com*, May 2010.
- M10 “Networked”, *Harvard Magazine*, May 2010.
- M9 “Total vernetzt”, *Zeit Wissen*, January 2010.
- M8 “Selbstmord durch Ansteckung”, *Der Spiegel*, April 28, 2008.
- M7 “Heikot linkit – verkon elinehto”, *Helsingin Sanomat*, 29 May 2007.
- M6 “Study maps network of 7 million cell phone users”, *PhysOrg.com*, May 12, 2007.
- M5 “Cellphone study shows the ties that bind nations”, *New Scientist*, April 24, 2007.
- M4 “Flüchtige Bekanntschaften halten die Info-Gesellschaft zusammen”, *Spiegel Online*, April 25, 2007.
- M3 “Mobile-phone network reveals the ties that bind”, *PhysicsWeb*, October 31, 2006.
- M2 “Tracking people’s electronic footprints”, *Science* **314**, 914-916 (2006).
- M1 “Death toll in Iraq: survey team takes on its critics”, *Nature* **446**, 6-7 (2007).

## Invited conference talks

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- 2011 Scheduled: SIAM Conference on Applications of Dynamical Systems, Snowbird, USA
- 2011 Scheduled: SAMSI Dynamics of Networks Workshop, Durham, USA
- 2010 SCNET 2010 - Science of Complex Networks, ECCS 2010, Lisbon, Portugal
- 2010 Kaski Symposium, Helsinki, Finland
- 2010 NetSci 2010 School, Northeastern University, USA
- 2010 Networks for Cross-Disciplinary Applications (Plenary speaker), Zaragoza, Spain
- 2009 Studying Society in a Digital World, Princeton University, USA
- 2009 Harvard International Development Conference, Harvard University, USA
- 2009 Social Brains and Social Networks, Oxford University, UK
- 2008 Complex Systems in a Nutshell, Oxford University, UK
- 2008 Network Science 2008 (Plenary speaker), Norwich, UK
- 2008 Empirical Analysis of Networks, Alicante, Spain
- 2008 Data in Complex Systems Conference, Palermo, Italy
- 2008 Workshop on Network Communities, Université Catholique de Louvain, Belgium
- 2007 Workshop on Social Networks, Microsoft Research, Cambridge, UK
- 2007 Conference on Computational Physics 2007, Brussels, Belgium
- 2007 Fluctuations and Noise 2007, Florence, Italy
- 2006 IMSc Complex Systems School 2006, Institute of Mathematical Sciences, Chennai, India

## Invited seminar talks

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- 2010 Applied Statistics Workshop, Institute for Quantitative Social Science, Harvard University, USA
- 2009 Computational Social Science Seminar, Sloan School, MIT, USA
- 2009 CCNR Network Seminar, Northeastern University, USA
- 2009 Health Care Policy Group Seminar, Harvard Medical School, Harvard University, USA
- 2009 Applied Mathematics Seminar, University of North Carolina at Chapel Hill, USA
- 2009 NICO Seminar, Northwestern University, USA
- 2008 Social Science Seminar, Nuffield College, Oxford University, UK
- 2008 CABDyN Complexity Seminar, Oxford University, UK
- 2008 Complexity Seminar, Centre for Complexity Science, Imperial College, London, UK
- 2008 Language and Complex Systems Workshop, Linguistics, Oxford University, UK
- 2008 Complexity Research Seminar, Brunel University, London, UK
- 2007 Mathematical Biology and Ecology Seminar, Center for Mathematical Biology, Oxford University, UK
- 2007 Social Science and Technology Seminar, Stanford University, USA

## Conference talks & Scientific visits

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- 2010 NetSci 2010, MIT, USA
- 2009 Harvard Political Networks Conference, Harvard University, USA
- 2008 UK Fungal Network: MMCOMNET Final Workshop, Oxford, UK
- 2008 Sociophysics Conference, Turin, Italy
- 2007 Social Data Mining and Knowledge Building Workshop, UCLA, USA
- 2006 Econophysics Colloquium 2006, Tokyo, Japan
- 2006 European Conference on Complex Systems (ECCS) 2006, Oxford, UK
- 2006 ONCE-CS Workshop on Complex Systems Science, Vilnius, Lithuania
- 2005 Visit to Prof. Albert-László Barabási, Harvard University, USA
- 2005 Visit to Prof. Neil F. Johnson, Department of Physics, Oxford University, UK
- 2005 School and Workshop on Structure and Function of Complex Networks, Trieste, Italy
- 2004 Visit to Prof. Albert-László Barabási, Department of Physics, University of Notre Dame, USA
- 2004 Visit to Prof. János Kertész, Department of Theoretical Physics, Budapest University, Hungary
- 2004 International Conference on Complex Systems 2004, Boston, USA
- 2003 The Second International Conference on Frontier Science: A Non-linear World, Pavia, Italy
- 2001 Visit to Prof. János Kertész, Department of Theoretical Physics, Budapest University, Hungary

## Teaching & Supervision

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- 2009 Assisting Prof. David Lazer in teaching, Harvard Kennedy School, Harvard University
- 2008 MBA guest lecturer, Saïd Business School, Oxford University
- 2008 Co-supervisor of M.Sc. Thesis, Applied Mathematics, Oxford University
- 2007 - 2009 Co-supervision of M.Phys. projects, Physics Department, Oxford University
- 2005 Teaching assistant, Complex Networks, HUT
- 2005 Guest lecturer and teaching assistant, Business Game, HUT
- 2004 Teaching assistant, Business Game, HUT
- 2003 Teaching assistant, Business Game, HUT

## Funded projects

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- 2009 - 2012 Co-investigator, Harnessing ICT-enabled collective social behaviour, EU FP7 #238597  
3 years, EUR 2,500,000 (approximately \$3,200,000)
- 2008 - 2011 Visiting Researcher, Fundamentals of Complexity Science, Eng. and Phys. Sc. Research Council  
3 years, GBP 375,000 (approximately \$580,000)

## Committee assignments

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- 2010 Scientific Committee Member, Information and Decision in Social Network, MIT, USA
- 2010 Committee Member, Analysis of Mobile Phone Networks, NetSci 2010, MIT, USA
- 2010 Technical Program Committee Member, Workshop on Dynamic Networks, Avignon, France
- 2008 Postdoctoral Fellow Search Committee, CABDyN Complexity Center, Oxford University
- 2008 Technical Program Committee Member, Complex 2009, Shanghai, China
- 2007 Doctoral Student Search Committee, Physics Department, Oxford University

## Other professional activities

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- Refereeing: *Science*, *Nature*, *Nature Physics*, *Physical Review Letters*, *Physical Review E*, *Europhysics Letters*, *European Physical Journal B*, *Physica A*, *Journal of Statistical Mechanics*, *Quantitative Finance*, *Social Networks*, *Journal of Theoretical Biology*
- Co-organizer of "Connecting the Dots – Network Visualization Symposium at Harvard University", October 22, 2010; <http://networks.iq.harvard.edu/>
- Coordinator of Network Reading Group, Harvard University (for details, see [www.jponnela.com](http://www.jponnela.com))
- Convenor of CABDyN Complexity Seminar 2007-2008, Saïd Business School, Oxford University; [www.cabdyn.ox.ac.uk](http://www.cabdyn.ox.ac.uk)
- Founder and coordinator of Complex Networks Journal Club 2007-2008, Physics Department, Oxford University; [www.cabdyn.ox.ac.uk](http://www.cabdyn.ox.ac.uk)

## Additional information

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- Languages: Fluent in Finnish and English, basic to intermediate in German, Swedish and Spanish
- Contributor to *Complexity and Social Networks Blog*, Institute for Quantitative Social Science, Harvard University; <http://www.iq.harvard.edu/blog/netgov/>

## References

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**Nicholas A. Christakis** **Current Supervisor / Harvard**  
Professor of Medical Sociology, Harvard Medical School  
Professor of Medicine, Harvard Medical School  
Professor of Sociology, Harvard Faculty of Arts and Sciences  
Master of Pforzheimer House, Harvard College

**David Lazer** **Supervisor / Harvard**  
Associate Professor, Political Science, Northeastern  
Associate Professor, Computer Science, Northeastern  
Director, Program on Networked Governance, Harvard Kennedy School

**Felix Reed-Tsochas** **Supervisor / Oxford**  
Lecturer, Complex Systems, Saïd Business School, Oxford University  
Co-Director, CABDyN Complexity Centre, Oxford University

**Kimmo Kaski** **Supervisor / Helsinki**  
Professor, Biomedical Engineering and Computational Science, HUT  
Head, Centre of Excellence in Computational Complex Systems, HUT

**Albert-László Barabási** **Collaborator / Northeastern**  
Distinguished Professor, Center for Complex Network Research, Northeastern  
Director, Center for Complex Network Research, Northeastern

**Mason A. Porter** **Collaborator / Oxford**  
University Lecturer, Mathematical Institute, Oxford University

**Gesine Reinert** **Collaborator / Oxford**  
Professor, Department of Statistics, Oxford University