

Iain D. Couzin

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Personal Details

Name: Iain Douglas Couzin

Nationality: British

Professional preparation

University of St. Andrews, UK	Biology	B.Sc. Hons. 1 st class, 1996
University of Bath, Bath, UK	Biology	Ph.D., 1999
University of Leeds, Leeds, UK	Postdoctoral researcher	2000 – 2002
Balliol College, Oxford, UK	Junior Research Fellow	M.A. (Oxon), 2003
Princeton University, Princeton, USA	Pew Biocomplexity Fellow	2002 – 2005
University of Oxford, Oxford, UK	Zoology & Math. Biol.	2002 – 2005

Appointments

Feb 2013 – present	Professor, Department of Ecology and Evolutionary Biology, Princeton University <i>Affiliated Faculty in Princeton Environmental Institute, Program in Applied and Computational Mathematics, Quantitative and Computational Biology, Princeton Institute for Computational Science and Engineering.</i>
Nov 2007 – Jan 2013	Assistant Professor, Department of Ecology and Evolutionary Biology, Princeton University
2005 – 2007	Royal Society University Research Fellow, Dept. of Zoology, University of Oxford
2003 – 2006	Junior Research Fellow in the Sciences, Balliol College, University of Oxford

Awards

2013	The Zoological Society of London Scientific Medal
2012	National Geographic's Emerging Explorer Award
2012	Top 5 most cited articles of the decade (1999-2010), Lab Times publication analysis of Animal Behavior Research, Europe (http://www.labtimes.org/)
2011	PopTech Science and Public Leadership Award
2010	Popular Science Magazine's 'Brilliant 10' Award
2009	The Mohammed Dahleh Award, UC Santa Barbara
2008	Searle Scholar Award ('for outstanding individuals in medicine, chemistry and the biological sciences', \$300,000)
2005	Royal Society University Research Fellowship
2003	Junior Research Fellowship in the Sciences, Balliol College, Oxford

Honors

2014	The Kwanghil Koh Lecture on Mathematics in Our Time, College of Sciences, NC State University Plenary Speaker, The Joint Annual Meeting of the Society of Mathematical Biology and the Japanese Society for Mathematical Biology, Osaka, Japan Keynote Address, 13th International Conference on Autonomous Agents and Multiagent Systems, Paris, France The Institute of Science and Technology (IST) Distinguished Lecturer Series, Austria
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- Interdisciplinary Distinguished Seminar, Federal Laboratory for Analytical Sciences and the Army Research Office, NC, USA
 Public Lecture and Keynote, Courant Research Center Symposium “Evolution of Social Behavior”, University of Göttingen, Germany
 Plenary Speaker, Interaction Networks and Collective Motion in Swarms, Flocks and Crowds, Helsinki, Finland
 Plenary Speaker, Animal Behavior Society Meeting, Princeton, USA
- 2013 Benjamin Meaker Visiting Professorship, Institute for Advanced Studies, University of Bristol
 BBC World Service & Wellcome Collection, “Exchanges at the Frontier, with Iain Couzin”
 London, broadcast on BBC World Service
 Public Lecture, Institute for Advanced Studies and Worldwide Universities Network, Bristol.
 Plenary Speaker, Behaviour 2013, Newcastle, UK
 Plenary Speaker, Animal Movement in Confined Space, University of Bristol, UK
 Center for Immunity, Infection and Evolution Visiting Professor, University of Edinburgh
 Howard Hughes Medical Research Institute, “Pathbreaking careers in science”
 Keynote Address, Israel Society of Ecology and Environmental Sciences
 The Jacob Marschak Speaker, UCLA Anderson School of Management
- 2012 The Murray Visiting Professorship, University of Sydney, Australia
 Bernard Rothenberg Lecturer in Biology and Public Policy, PA
 von Neumann Public Lecture, Institute for Discovery, University of Wisconsin Madison
 National Geographic Live! Discussion between Nobel Laureate Mario Molina and National Geographic Explorer Iain D. Couzin
 Keynote Address, Max Planck Symposium on Biodiversity, Berlin
 N.J. Brainpower List
 Public Lecture, Harvard Museum of Natural History
 Keynote Address, NVIDIA GPU Technology Conference, San Jose
 Visiting Professor, Tel Aviv University
 Forum Speaker, Aspen Environment Forum, Aspen, Colorado
 Keynote Address, NetSci 2012, Northwestern University
 Plenary Lecture, Collective Intelligence 2012, MIT, Boston
- 2011 The Prosser Lecture, Dartmouth College
 The Blundon Lecture, Nova Scotia
 The Storer Lecture, UC Davis
 BigThink Delphi Fellow
 Plenary Lecture, Mathematical Biosciences Institute, Ohio State University
 The Santa Fe Community Lecture, James A. Little Theatre, Santa Fe
- 2010 Public Lecture, Center for Science and Industry IMAX Theatre, Columbus, OH;
 Distinguished Lecturer, Pacific Institute for Mathematical Sciences
 Plenary Address, International Union for the Study of Social Insects (IUSSI),
 Copenhagen
 Keynote Address, Forum for the Future of Complex Systems, UNC, Charlotte
 Distinguished Speaker, Pacific Institute for the Mathematical Sciences and Center for Scientific Computing, Canada
- 2009 Mohammed Dahleh Distinguished Lecture, UC Santa Barbara
 Top 10 most cited articles in 2009 (5th), *Phil. Trans. Roy. Soc. Lond. B*
 Member of the Faculty of 1000 Biology
- 2008 The Marsden Lecture, McGill University, Canada
 World Science Festival, NYC

Keynote Lecture, 'Formation flying, missions and technologies', European Space Agency

2007 Plenary speaker, International Conference on Complex Systems, Boston
Plenary speaker, Society for Industrial and Applied Mathematics (SIAM) Dynamics, Snowbird, Utah
Plenary speaker, Dynamics Days, Boston

2003 Fellow of the Center for Interdisciplinary Research, University of Bielefeld

Additional Invited Seminars and Lectures (from 2007)

2014 Interdisciplinary Center for Life Sciences and Engineering Seminar, Technion - Israel Institute of Technology
Department of Biology Seminar, Bar Ilan University, Israel
6th SIDEER Symposium, Exploring Real World Networks, From Genes to Ecosystems, Sede Boqer Campus of Ben Gurion University, Israel
Shalom Applebaum Memorial Lecture, The Hebrew University, Rehovot, Israel
Departmental Seminar, Department of Evolution, Systematics and Ecology, The Hebrew University, Jerusalem, Israel

2013 Invited speaker, Deutsche Physikalische Gesellschaft Spring Meeting, Regensburg
Biophysics seminar, MIT
Graduate Student Invited Speaker, Department of Ecology and Evolutionary Biology, Cornell.
Graduate Student Invited Speaker, Department of Neurobiology and Behavior, Cornell.
Google Science Fair
Complexity Group Seminar, Stanford University
Office of Naval Research, Science of Autonomy Meeting
Center for Immunity, Infection and Evolution Special Seminar, University of Edinburgh
Batsheva de Rothschild Seminar on Marine Life in the Flow, Eilat, Israel
Organizer, Animal Swarms Workshop, Israel
Graduate student invited speaker, Department of Ecology and Evolutionary Biology, University of Arizona
Biocomplexity seminar, Stanford University

2012 Science magazine Live Chat, The Science of Decision-Making
Society for Social Neuroscience Annual Meeting, New Orleans
Sensory Coding and the natural Environment, IST Austria
Center for Studies of Physics and Biology, The Rockefeller University
Champalimaud Foundation Ar Event, Lisbon
Neuroscience Seminar, Champalimaud Center for the Unknown, Lisbon, Portugal
Departmental Seminar, Biology, Texas A&M
Departmental Seminar, School of Biological Sciences, UT Austin
Princeton Institute In Computational Science and Engineering Conference
Graduate Student Invited Speaker, School of Biological Sciences, UC Irvine
Department of Neuroscience, UC Irvine
School of Biological Sciences, University of Sydney
Department of Mathematics, University of Pittsburgh

2011 Department of Organismic and Evolutionary Biology Seminar, Harvard University
Department of Psychology Seminar, Harvard University
PopTech Conference, Maine
Undergraduate Invited Speaker, Dept. of Biochemistry, University of Pennsylvania
Graduate Student Invited Speaker, Tufts University
Graduate Student Invited Speaker, University of Florida

- Plenary Speaker, Insect self-organization and swarming, Math. Biosci. Institute, Ohio State University
 Graduate Student Annual Invited Speaker, University of Florida
 Woods Hole Marine Biology Laboratory, Woods Hole
 Institute of Evolution, University of Haifa, Israel
 Ecology, Evolutionary Biology and Behavior, Michigan State University
 City University of New York, New York
 Ernst Strungmann Forum, Frankfurt institute for Advanced Studies
- 2010 Microbes to Metazoans: Evolution of Social Behavior, Georgia Tech, 2010
 Workshop in Honor of Danny Cohen's 80th Birthday, The Hebrew University, Jerusalem
 BIOCOMPLEXITY XI, The evolution of cooperation, Bloomington, Indiana
 EVOS Seminar, Binghamton University
 Department of Biology, Tel Aviv University
 Department of Physics, University of Maryland
 Lecturer, Complex Systems Summer School, Santa Fe
 Workshop on Nonlinear Dynamics of Networks, University of Maryland
 Workshop on Group Behavior, University of Arizona
 Disease in Motion, Princeton University
 Swarm Workshop, Max Planck Institute for the Physics of Living Systems, Dresden
- 2009 Applied Mathematics Colloquium, Cornell University
 Robotics Institute, Carnegie Mellon University
 DARPA Microsystems Technology Office Seminar, San Jose
 Sloan-Schwartz Annual Meeting on Computational Neuroscience, Harvard University
 Invitational speech, Board of National Institute of General Medical Sciences, Bethesda
 Ecology Seminar, University of Pennsylvania
 Workshop on Soft Active Materials, Syracuse University
 Collective Decision Making Workshop, Santa Fe Institute, Santa Fe
 Department of Neurobiology, Weizmann Institute, Israel
- 2008 Session Leader, Collective Animal Motion, Gordon Research Conference on Theoretical Biology and Biomathematics, Italy
 NSF Workshop on Complex Systems, Washington DC
 Renaissance Technologies Colloquium, Long Island, NY
 NIH Modeling Social Behavior, Bethesda, MD
 Princeton Plasma Physics Laboratory, Princeton, NJ
- 2007 Divisional seminar, Division of Biology, Caltech
 Department of Ecology and Evolutionary Biology and Institute for Genomics and Systems Biology, University of Chicago
 Centre for Integrative Multiscale Modeling & Control and Dynamical Systems, Caltech
 Department of Biosciences, Birmingham University, UK
 AAAS Meeting, San Francisco
 Speaker, BIOCOMP, Italy
 Departmental Seminar, Mechanical Engineering, MIT

Scientific Service (Outside Princeton University)

- Editor, *eLife* (Sept 2014 -)
 Editor, *Movement Ecology* (2012 -)
 Editor, *Behavioral Ecology* (until mid-2011)
 Editorial Board, *Journal of Nonlinear Science*

Associate Editor, *Advances in Complex Systems*

Editorial Board, *Swarm Intelligence*

Guest Editor, *PLoS Computational Biology*

Guest Editor, *Proceedings of the National Academy of Sciences USA (PNAS)*

Founding Advisory Board Member, National Institute for Mathematical and Biological Synthesis (NIMBioS). University of Tennessee, Knoxville.

Scientific Management Board / International Advisory Board, “Complex agent-based dynamic networks” research group at the University of Oxford (*until 2012*)

Advisory Board. Terreform ONE, Ecological Design Group for Urban Infrastructure, Planning and Art. Scientific Advisory Board, Lifeboat Foundation

Advisor, Harvard Business Review and the World Economic Forum, Manhattan, 2008

Advisor, Seed Business Group and the World Economic Forum, Cambridge, MA, 2008

Advisor to the NSF bio-directorate on systems biology, 2007

Adviser to the Department of Trade and Industry on ‘intelligent infrastructure’ (invited by Sir David King, Chief Scientific Advisor to H.M. Government), 2004

Scientific Service (Princeton University) Graduate Student Admissions Committee & Faculty Search Committee, Department of Ecology and Evolutionary Biology, 2010; Research Computing Advisory Group, 2010-present; Institutional Animal Care and Use Committee, 2007-2010

Scientific Service (Outreach Activities)

National Geographic Learning, Learning Statistics Book, “How statistics fit into the big picture”: employs my data to show real-world examples of using statistics to enable scientific discovery, 2012-present

Science magazine Live Chat, The Science of Decision-Making, 2012

The Secret Science Club, The Bell House, Brooklyn, 2011

PopTech, 2011 | http://poptech.org/popcasts/ian_couzin_collective_behavior

The OpenSwarm Initiative: to introduce collective behavior and pattern formation in nature to the public, and students across disciplines, through art, robotics and biology, from 2010

Metro High School, Columbus OH, Introducing the OpenSwarm Initiative

RadioLab’s AWE-MAGEDDON Curiosity Cabaret, Manhattan, NYC, 2010

<http://www.wnyc.org/thegreenespace/events/2010/apr/14/radiolabs-awe-maggeddon/>

The Secret Science Club, Brooklyn, NYC, 2010

BigThink Interview, 2010

World Science Festival, Manhattan, NYC: “Traffic, from insects to interstates” panelist with Mitchell Joachim and Anna Nagurny, moderated by Robert Krulwich, 2009

Edge.org “Interview with Iain Couzin” selected for Harper Collins Book “Best of Edge”, 2009

Science on Saturday, for middle- and high-school students, 2008

Plenary speaker at the International IdeaFestival, Kentucky

Featured in, “Cool Careers in Science”, Sally Ride Science (for upper elementary and middle school) and one of 5 scientists featured in “Social Lives of Animals” by Scholastic (for ages 7-9)

AimHigher Masterclasses at Newcastle United’s “St. James Park” and Sunderland F.C.’s “The Stadium of Light”: to raise aspirations, awareness and attainment of young people from disadvantaged backgrounds, under-represented groups and people with disabilities, 2005

Teaching

Undergraduate class: EEB 323, *Integrative Dynamics of Animal Behavior*

Graduate classes: EEB 521, *Tropical Ecology*; EEB 504, *Fundamental Concepts in Ecology and Evolutionary Biology*; EEB 506, *Responsible Conduct in Research*

Publications

2014

[94] Rosenthal, S.B., Twomey, C.R., Wu, H.S., & Couzin, I.D. (2014) Revealing the hidden network of social interactions in animal groups allows prediction of complex behavioral contagion, *submitted*.

[93] Ioannou, C.C, Singh, M.A.N. & Couzin, I.D. (2014) Potential leaders trade off goal-oriented and socially-oriented behavior in mobile animal groups, *submitted*.

[92] Hills, T.T., Todd, P.M., Laser, D. Redish, A.D., Couzin, I.D. and the Cognitive Search Research Group (2014) Exploration versus exploitation in space, mind and society, ***Trends in Cognitive Sciences*** resubmitted following revision.

[91] Torney, C.J., Lorenzi, T., Couzin, I.D. & Levin, S.A. (2014) Information processing and the evolution of unresponsiveness in collective systems, ***Journal of the Royal Society Interface*** in revision.

[90] Woods, M.L., Carmona-Fontaine, C., Barnes, C.P., Couzin, I.D., Mayor, R. & Page, K. (2014) Directional collective cell migration emerges as a property of cell interactions ***PLoS ONE*** 9, e104969

[89] Hofmann, H.A., Beery, A.K., Blumstein, D.T., Couzin, I.D., Earley, R.L., Hayes, L.D., Hurd, P.L., Lacey, E.A., Phelps, S.M., Solomon, N.G., Taborsky, M., Young, I.J. & Rubenstein, D.R. (2014) An evolutionary framework for studying mechanisms of social behavior. ***Trends in Ecology and Evolution*** 29(10), 581-589.

[88] Kao, A., Miller, N., Torney, C., Hartnett, A. & Couzin, I.D. (2014) Collective learning and optimal consensus in animal groups, ***PLoS Computational Biology*** 10(8), e1003762.

[87] Liu, P., Safford, H.R., Couzin, I.D. & Kevrekidis, I.G. (2014) Coarse-grained variables for particle-based models: diffusion maps and animal swarming simulations, ***Computational Particle Mechanics***, available early online.

[86] Treuer, T., Altosaar, J., Hartnett, A., Twomey, C., Dobson, A., Wilcove, D. & Couzin, I.D. (2014) Machine learning in audio taxonomy: Quantifying biodiversity and habitat recovery through rainforest audio recordings, ***The Journal of the Acoustical Society of America*** 135(4), 2368.

[85] Gallup, A.C., Chong, A., Kacelnik, A. & Couzin, I.D. (2014) The influence of emotional facial expressions on gaze-following in grouped and solitary pedestrians, ***Scientific Reports*** 4, 5794.

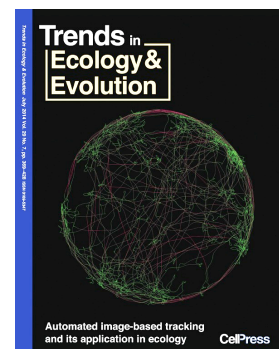
[84] Berdahl, A., Westley, P.A.H., Couzin, I.D., Levin, S.A. & Quinn, T.P. (2014) A collective navigation hypothesis for homeward migration in anadromous salmonids. ***Fish and Fisheries***, available early online. DOI: 10.1111/faf.12084

[83] Dell, A.I., Bender, J.A., Branson, K., Couzin, I.D., dePolavieja, G.G., Noldus, L.P.J., Perez-Escudero, A., Perona, P., Straw, A.D., Wikelski, M. & Brose, U. (2014) Automated image-based tracking and its application in ecology. ***Trends in Ecology and Evolution*** 29(7), 417-428.

[82] Kao, A.B. & Couzin, I.D. (2014) Decision accuracy in complex environments is often maximized by small group sizes, ***Proceedings of the Royal Society of London Series B*** 281(1784), 20133305.

2013

[81] Berdahl, A., Torney, C.J., Ioannou, C.C., Faria, J., & Couzin, I.D. (2013) Emergent sensing of complex environments by mobile animal groups. ***Science*** 339(6119), 574-576.



[80] Strandburg-Peshkin, A., Twomey, C.R., Bode, N.W., Kao, A.B., Katz, Y., Ioannou, C.C., Rosenthal, S.B., Torney, C.J., Wu, H., Levin, S.A. & Couzin, I.D. (2013) Visual sensory networks and effective information transfer in animal groups. **Current Biology** 23(17), R709-711.

[79] Miller, N., Garnier, S. & Couzin, I.D. (2013) Risk and information determine collective decision-making in animal groups, **Proceedings of the National Academy of Sciences USA** 110(13), 5263-5268.

[78] Coburn, L., Cerone, L., Torney, C., Couzin, I.D. & Neufeld, Z. (2013) Tactile interactions lead to coherent motion and enhanced chemotaxis of migrating cells, **Physical Biology** 10(4), 046002.

[77] Kolpas, A., Busch, M., Li, H. Couzin, I.D., Petzold, L. & Moehlis, J. (2013) Spatial position and influence in swarms, **PLoS ONE** 8(3), e58525.

[76] Torney, C., Levin, S.A. & Couzin, I.D. (2013) Decision accuracy and the role of spatial interactions in social dynamics, **Journal of Statistical Physics** 151, 203-217.

[75] Garnier, S., Murphy, T., Lutz, M., Hurme, E., Leblanc, S. & Couzin, I.D. (2013) Stability and responsiveness in a self-organized living architecture. **PLoS Computational Biology** 9(3), e1002984.

[74] Tunstrom, K., Katz, Y., Ioannou, C.C., Huepe, C., Lutz, M., & Couzin, I.D. (2013) Collective states, multistability and transitional behavior in animal groups. **PLoS Computational Biology** 9(2), e1002915.

[73] Shaw, A.K. & Couzin, I.D. (2013) Migration or residency? The evolution of movement behavior and information usage in seasonal environments. **The American Naturalist** 181(1), 114-121.

[72] Perez-Escudero, A., Miller, N., Hartnett, A.T., Garnier, S., Couzin, I.D. & de Polavieja, G. (2013) Estimation models describe well collective decisions among three options. **Proceedings of the National Academy of Sciences USA** 110(37), E3466-3467.

2012

[71] Ioannou, C.C., Guttal, V. & Couzin, I.D. (2012) Predatory fish select for coordinated collective motion in virtual prey, **Science** 337(6099), 1212-1215.

- Accompanying Perspective of our paper by Bill Romey “Real fish attack simulated plankton” *Science* 337(6099), 1181-1182.

[70] Lopez, U., Gaitrais, J., Couzin, I.D. & Theraulaz, G. (2012) From behavioral analyses to models of collective motion in fish schools, **Interface Focus** 2(6), 693-707.

[69] Stephens, D.W., Couzin, I.D. & Giraldeau, L.-A. (2012) Ecological and behavioral approaches to search behavior. In “Cognitive Search: Evolution, Algorithms and the Brain” (Eds. P.M. Todd, T.T. Hill and T.W. Robins), MIT Press, Boston.

[68] Mishra, S., Tunstrom, K., Couzin, I.D. & Huepe, C. (2012) Collective dynamics of self-propelled particles with variable speed. **Physical Review E**, 86, 011901.

[67] Guttal, V., Romanczuk, P., Simpson, S.J. & Couzin, I.D. (2012) Cannibalism as a driver of the evolution of behavioral phase polyphenism in locusts. **Ecology Letters** 15, 1158-1166.

[66] Handegard, N.O., Leblanc, S., Boswell, K., Tjostheim, D. & Couzin, I.D. (2012) Interactions between group hunting predators and schooling prey in a natural marine environment. **Current Biology** 22(13), 1213-1217.

- Accompanying Dispatches article by Graeme Ruxton “Collective dynamics - both predators and prey get help from their friends”

[65] Gallup, A.C., Hale, J.J., Garnier, S., Sumpter, D.J.T., Kacelnik, A., Krebs, J. & Couzin, I.D. (2012) Visual attention and information transfer in human crowds. **Proceedings of the National Academy of Sciences USA** 109(19), 7245-7250.

[64] Gallup, A.C., Chong, A. & Couzin, I.D. (2012) The directional flow of visual information transfer between pedestrians. **Biology Letters** 8(4), 520-522.

[63] Swain, D.T., Couzin, I.D. & Leonard, N.E. (2012) Real-time feedback-controlled robotic fish for behavioral experiments with schooling fish. **Proceedings of the IEEE** 100(1), 150-163.

[62] Bazazi, S., Bartumeus, F., Hale, J.J., Holmin, A.J. & Couzin, I.D. (2012) Intermittent motion in desert locusts: behavioral complexity in simple environments. **PLoS Computational Biology** 8(5), e1002498.

[61] Bazazi, S., Pfennig, K.S., Handegard, N.O. & Couzin, I.D. (2012) Collective vortex formation and foraging in polyphenic spadefoot toad tadpoles. **Behavioral Ecology and Sociobiology** 66(6), 879-889.

[60] Leonard, N.E., Shen, T., Nabet, B., Scardovi, L., Couzin, I.D. & Levin, S.A. (2012) Decision versus compromise for animal groups in motion. **Proceedings of the National Academy of Sciences USA** 109(1), 227-232.

2011

[59] Couzin, I.D., Ioannou, C.C., Demirel, G., Gross, T., Torney, C.J., Hartnett, A., Conradt, L., Levin, S.A. & Leonard, N.E. (2011) Uninformed individuals promote democratic consensus in animal groups. **Science** 323(6062), 1578-1580.

- Accompanying Perspective of our paper by West and Bergstrom “Can ignorance promote democracy?” *Science* 323(6062), 1503-1504.

[58] Katz, Y., Ioannou, C.C., Tunstrom, K., Huepe, C. & Couzin, I.D. (2011) Inferring the structure and dynamics of interactions in schooling fish. **Proceedings of the National Academy of Sciences USA** 108(46), 18720-18725.

[57] Torney, C., Berdahl, A. and Couzin, I.D. (2011) Signaling and the evolution of cooperative foraging in dynamic environments, **PLoS Computational Biology** 7(9), e1002194.

[56] Frewen, T. A., Couzin, I.D., Kolpas, A., Moehlis, J., Coifman, R. & Kevrekidis, I. O. (2011) Coarse collective dynamics of animal groups. **Lecture Notes in Comp. Sci. & Engineering** 75, 299-309.

[55] Guttal, V., & Couzin, I.D. (2011) Leadership, collective motion and the evolution of migratory strategies. **Communicative and Integrative Biology** 4, 294-298.

[54] Abbot, P...Couzin, I.D....*et al.* (137 authors) (2011) Inclusive fitness theory and eusociality. **Nature** 471(7339), e1-e4.

[53] Pillot, M-H., Gautrais, J., Arrufat, P., Couzin, I.D., Bon, R. & Deneubourg, J-L. (2011) Scalable rules for effective decision-making in animal groups. **PLoS ONE** 6(1), 14487.

[52] Bazazi, S., Romanczuk, P., Thomas, S., Schimansky-Geier, L., Hale, J. J., Miller, G. A., Sword, G.A., Simpson, S.J. and Couzin, I.D. (2011) Nutritional state and collective motion: from individuals to mass migration. **Proceedings of the Royal Society of London Series B** 278(1704), 356-363.

[51] Sueur, C., Petit, O., Deneubourg, J-L., & Couzin, I.D. (2011) Group size, grooming and social cohesion in primates: a modeling approach based on group structure. **Journal of Theoretical Biology** 273(1), 156-166.



2010

[50] Guttal, V. & Couzin, I.D. (2010) Social interactions, information use and the evolution of collective migration. **Proceedings of the National Academy of Sciences USA** 107(37), 16172-16177.

- 'From the Cover', 'This Week in PNAS' and PNAS Commentary by Simpson and Sword "Evolving Migration" **107**(39), 16753-16754.

[49] Torney, C., Levin, S. A. & Couzin, I.D. (2010) Specialization and evolutionary branching within migratory populations. **Proceedings of the National Academy of Sciences USA** 107(47), 20394-20399.

- Recommended by 'Faculty of 1000'

[48] Couzin, I.D. (2010) Complex systems: An informative itinerary. **Science** 328(5977), 430.

[47] Bazazi, S., Ioannou, C. C., Simpson, S. J., Sword, G. A., Torney, C. & Couzin, I.D. (2010) The social context of cannibalism in Mormon cricket collective movement. **PLoS ONE** 5(12), e15118.

[46] Sueur, C., Deneubourg, J.-L., Petit, O. & Couzin, I.D. (2010) Differences in nutrient requirements imply a non-linear emergence of leaders in animal groups. **PLoS Computational Biology** 6(9), 1000917.

[45] Faria, J. J., Dyer, J. R. G., Clement, R., Couzin, I.D., Holt, N., & Ward, A. J., et al. (2010) A novel method for investigating the collective behavior of fish: introducing "Robofish". **Behavioral Ecology and Sociobiology** 64(8), 1211-1218.

[44] Escudero, C., Yates, C. A., Buhl, J., Couzin, I.D., Erban, R., Kevrekidis, I. G., & Maini, P. K. (2010) Ergodic directional switching in mobile insect groups. **Physical Review E** 82(1), 011926.

[43] Couzin, I.D. and King, A.J. (2010) Animal group movements. In: *Encyclopedia of Animal Behavior*, Breed, M. and Moore, J. (Eds.), Elsevier.

[42] Simpson, S. J., Raubenheimer, D., Charleston, M.A., Clissold, F. J., Couzin, I.D., & Clements, K. D., et al. (2010) Modelling nutritional interactions: from individuals to communities. **Trends in Ecology and Evolution** 25(1), 53-60.

2009

[41] Torney, C., Neufeld, Z. & Couzin, I.D. (2009) Context-dependent interaction leads to emergent search behavior in social aggregates. **Proceedings of the National Academy of Sciences USA** 106(52), 22055-22060.

[40] Yates, C.A., Erban, R., Escudero, C., Couzin, I.D., Buhl, J., & Kevrekidis, I. G., et al. (2009). Inherent noise can facilitate coherence in collective swarm motion. **Proceedings of the National Academy of Sciences USA** 106(14), 5464-5469.

[39] Conradt, L., Roper, T.J., Couzin, I.D. & Krause, J. (2009) "Leading according to need" in self-organizing groups. **The American Naturalist** 173(3), 304-312.

[38] Romanczuk, P., Couzin, I.D. & Schimansky-Geier, L. (2009) Collective motion of animal groups due to escape and pursuit behavior. **Physical Review Letters** 102(1), doc# 010602.

[37] Deisboeck, T. & Couzin, I.D. (2009) Collective behavior in cancer cell populations. **BioEssays** 31(2), 190-197.

[36] Couzin, I.D. & Laidre, M.E. (2009) Fission-fusion populations. **Current Biology** 19(15), r633-r635.

[35] Dyer, J.R.G., Johansson, A., Helbing, D., Couzin, I.D. & Krause, J. (2009) Leadership, consensus decision making and collective behaviour in human crowds. ***Philosophical Transactions of the Royal Society of London, Series B*** 364(1518), 781-78.

- Top 10 most cited articles in *Phil. Trans. R. Soc. Lond B.* in 2009

[34] Nabet, B., Leonard, N.E., Couzin, I.D. & Levin, S.A. (2009) Dynamics of decision-making in animal group motion. ***Journal of Nonlinear Science*** 19(4), 399-435.

[33] Erra, U., Frola, B., Scarano, V. & Couzin, I.D. (2009) An efficient GPU implementation for large scale individual-based simulation of collective behavior, ***High Performance Computational Systems Biology***, 51-58.

[32] Couzin, I.D. (2009) Collective cognition in animal groups. ***Trends in Cognitive Sciences*** 13(1), 36-43.



2008

[31] Sumpter, D.J.T., Krause, J., James, R., Couzin, I.D. & Ward, A.J.W. (2008) Consensus decision-making by fish. ***Current Biology*** 18(22), 1773-1777.

[30] Bazazi, S., Buhl, J., Hale, J.J., Anstey, M.L., Sword, G.A., Simpson, S.J. & Couzin, I.D. (2008) Collective motion and cannibalism in locust marching bands. ***Current Biology*** 18(10), 735-739.

- Recommended by 'Faculty of 1000' – Rating II, Exceptional.



[29] Ward, A.J., Sumpter, D.J.T., Couzin, I.D., Hart, P.J.B. & Krause, J. (2008) Quorum decision-making facilitates information transfer in fish shoals. ***Proceedings of the National Academy of Sciences USA*** 105(19), 6948-6953.

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[21] Buhl, J., Sumpter, D.J.T., Couzin, I.D., Hale, J., Despland, E., Miller, E. & Simpson, S.J. (2006) From disorder to order in marching locusts. ***Science*** 312, 1402-1406.

- Selected for 'Research Highlights' in *Nature*, 'Perspectives' article, D. Grunbaum "Align in the sand" *Science* 312, 1320-1322.

[20] Couzin, I.D. (2006) Behavioural ecology: social organization in fission-fusion societies. **Current Biology** 16, R169-171.

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- Selected for 'News and Views' in *Nature*, Recommended by 'Faculty of 1000'.

[18] Nabet, B., Leonard, N.E., Couzin, I.D. & Levin, S.A. (2006) Leadership in animal group motion: a bifurcation analysis, **Proc. 17th Symposium on Mathematical Theory of Networks and Systems**, 1-14

[17] Couzin, I.D., James, R., Croft, D.P. & Krause, J. (2006) Social organization and information transfer in schooling fish *Fish Cognition and Behaviour*.

2005 and earlier

[16] Couzin, I.D., Krause, J., Franks, N.R. & Levin, S.A. (2005) Effective leadership and decision making in animal groups on the move. **Nature** 433, 513-516.



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[14] Hensor, E.M.A., Couzin, I.D., James, R. & Krause, J. (2005) Modelling density-dependent fish shoal distributions in the laboratory and field. **Oikos** 110, 344-352.

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- Featured as 'Editor's Choice' in *Science*

[10] Croft, D. P., Arrowsmith, B. J., Bielby, J., Skinner, K., White, E., Couzin, I.D., Magurran, A. E., Ranmarine, I. & Krause, J. (2003) Mechanisms underlying shoal composition in the Trinidadian guppy (*Poecilia reticulata*) **Oikos** 100, 429-438.

[9] Croft, D. P., Krause, J., Couzin, I.D. & Pitcher, T. J. (2003) When fish schools meet: outcomes for evolution and fisheries **Fish and Fisheries** 4, 138-146.

[8] Couzin, I.D., Krause, J., James, R., Ruxton, G.D. & Franks, N.R., (2002) Collective memory and spatial sorting in animal groups. **Journal of Theoretical Biology** 218, 1-11.

- Recommended by Faculty of 1000
- Top 5 most cited articles of the decade (1999-2010), Animal Behavior Research, Europe

[7] Ward, A. J. W., Hoare, D. J., Couzin, I.D. & Krause, J. (2002) The effects of parasitism and body length on positioning within wild fish shoals **Journal of Animal Ecology** 71(1), 10-14.

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[5] Hoare, D. J., Ward, A., Couzin, I.D., Croft, D. & Krause, J. (2001) A grid-net technique for the analysis of fish positions in free-ranging fish schools **Journal of Fish Biology** 59(6), 1667-1672.

[4] Roditakis, E., Couzin, I.D., Barlow, K., Franks, N. R. & Charnley, A. K. (2000) Improving secondary pick up of insect fungal pathogen conidia by manipulating host behavior ***Annals of Applied Biology*** 137, 329-335.

[3] Boi, S., Couzin, I.D., Del Buono, N., Franks, N. R. & Britton, N. F. (1999) Coupled oscillators and activity waves in ant colonies ***Proceedings of the Royal Society of London Series B*** 266, 371-378.

[2] Spencer, A. J., Couzin, I.D. & Franks, N. R. (1998) The dynamics of specialization and generalization within biological populations ***Journal of Complex Systems*** 1, 114-128.

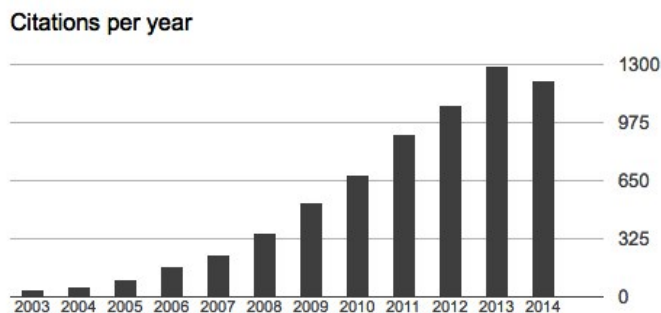
[1] Ritchie, M. G. R., Couzin, I.D. & Snedden, W. A. (1995) What's in a song? Female bushcrickets discriminate against the song of older males ***Proceedings of the Royal Society of London Series B*** 262, 21-27.

Citation analysis (via GoogleScholar)

Most cited paper: Couzin *et al.* (2005) *Nature*, 1169 citations

20 papers cited > 100 times

Citations per year, as of Oct 2014:



Previous members of the lab

Dr. Allison Shaw was a PhD student and is now an Assistant Professor at the University of Minnesota, USA.

Dr. Sepideh Bazazi, was a D.Phil. (Oxon) student and is now a Postdoctoral Researcher at Universite Paul Sabatier, Toulouse, France

Dr. Andrew Berdahl was a PhD student (Princeton) and is now an Omidyar Fellow at the Santa Fe Institute.

Dr Hai Shan Wu was a postdoc in the lab for 2 years and is now a data scientist and team leader in the Big Data Lab of Baidu Research Institute, Beijing.

Dr. Chistos Ioannou was a postdoc in my lab for 2 years and is now a Leverhulme Trust Fellow and Lecturer at the University of Bristol, UK. He is the recipient of the 2013 Association for the Study of Animal Behavior Young Investigator Award.

Dr. Colin Torney is a Lecturer at the University of Exeter, UK

Dr. Noam Miller was a postdoc in the group for 3 years and is now an Assistant Professor at Wilfred Laurier University, Canada

Dr. Simon Garnier was a postdoc in the lab for 3 years and is now an Assistant Professor at the New Jersey Institute of Technology

Agency: National Science Foundation (NSF)

Duration: 09/03/2009 – 09/30/2013

Award: \$543,472

Coordination and collective decision-making (co-PI with Simon A. Levin and Naomi E. Leonard)

Agency: Army Research Office

Duration: 08/17/2011 - 06/16/2013

Award: \$420,326

Bio-Inspired Autonomous Control for Optimal Exploration and Exploitation in Marine Environments
(Co-PI with Naomi Leonard, Princeton University, and Fumin Zhang, Georgia Tech)

Agency: Office of Naval Research (ONR)

Duration: 06/01/2009 – 05/31/2014

Award: \$3,000,000

Collective Behavior and Social Transmission of Information in Human Crowds (PI)

Agency: Oxford Risk Research and Analyses Ltd.

Duration: 09/15/2010 – 09/14/2012

Award: \$174,863

Collective Motion and Decision-Making in Animal Groups (PI)

Agency: Kinship Foundation, Searle Scholars Program

Duration: 07/01/2008 – 06/30/2011

Award: \$300,000

Selected media attention

(2014) Feature article by Michael Brooks, “Mind Meld: The Genius of Swarm Thinking”, New Scientist magazine

(2013) Feature article by Ed Yong: “As one: the science of swarms” WIRED magazine

(2013) Front cover article by Christina Luiggi “Crowd Control” in The Scientist magazine

(2013) National Geographic, “The real wisdom of crowds”

(2013) New Scientist, “Swarm-mongering: Brainless blobs flock together”

(2012) New York Times, Sunday Review, ‘Walk like a fish’

(2012) National Geographic, ‘Can we control other peoples minds? Should we?’

(2012) Discover, ‘To work out why fish swim together, tempt a predator with virtual prey’

(2012) NPR, ‘Swarming up a storm: why animals school and flock’

(2012) The Economist, ‘The benefits of schooling’

(2012) The Telegraph India, ‘Fish spill group secret on video game’

(2012) BBC News, ‘Fish play video game in new behaviour study’

(2012) Wired, ‘Predatory fish play video game to answer evolutionary quandry’

(2012) Wall Street Journal, ‘Chips not just for gamers anymore’

(2012) National Geographic Magazine, Emerging Explorers Award

(2012) CNN, ‘In Mauritania: sunny with a chance of locusts’

(2011) BBC, Interviewed in ‘The Code’ BBC2, predicting human crowds

(2011) TIME, ‘America votes with the fishes’

(2011) Wall Street Journal, ‘A fishy study of uninformed voters?’

(2011) Brunei Times, ‘Minnows reveal true power of the ‘uninformed’

(2011) Wired, ‘How ignorance could improve group decisions’

(2011) BBC News, ‘Disinterested ‘key in democracy’

(2011) Miller-McCune, ‘Why a democracy needs uninformed people’

(2011) ScienceNews, ‘Uncommitted newbies can foil forceful few’

(2011) Chronicle of Higher Education, ‘Study of fish suggests the value of uninformed voters’

(2011) Australian Broadcasting Corporation, ‘Minnows reveal power of the uninformed’

(2011) MSNBC.com, 'Can ignorance make a better democracy? In fish it can...'

(2011) The Daily Mail, 'Vote for apathy?'

(2011) The Economist, "Collective behavior: Follow my leader"

(2011) ScienceNews, 'School rules'

(2010) New York Times, Environment, "On the migratory trail, leaders and followers"

(2010) Popular Science Magazine, Featured as one of the 'Brilliant 10'

(2010) Wired Science, "How mass migration might have evolved"

(2010) Wired News, "Math is no match for locust swarms"

(2010) ScienceDaily, "Introducing robofish: leading the crowd in studying group dynamics"

(2010) Welt, "Roboterfisch führt schwärme"

(2010) Slashdot, "'Robotfish' schools the rest"

(2010) SETI Radio, "Swarm in here ... or is it just me?"

(2010) Big Think, Interview with Iain Couzin: <http://bigthink.com/IainCouzin>

(2010) ScienceNews, "Swarming locusts impossible to predict"

(2009, 2010) Edge.org Interview with Iain Couzin "Ants have algorithms" selected for HarperCollins book "Best of Edge: Life" (Couzin, Dawkins, Dyson, Endy, Haig, Kauffman, Kurzweil, Lloyd, Ridley, Strogatz, Trivers, Venter, E.O. Wilson).

(2009) Science Illustrated (front cover article 'Swarm!')

(2009) ABC News, Interviewed on 'Good Morning America'

(2009) "On My Mind" by Iain Couzin, SEED Magazine.

(2009) "Traffic: From insects to interstates", World Science Festival, New York City

(2008) BBC News, "Cannibal theory for locust swarms"

(2008) Channel 4 (UK) News, "Locusts driven by cannibalism"

(2008) Nature News, "Cannibalism drives locust swarms"

(2008) New Scientist, "The hunger the horror".

(2008) The Economic Times, "Cannibalism drives vast locust swarms"

(2008) Der Spiegel feature article "Schlauer im swarm"

(2008) Science Daily "What's bugging locusts?"

(2008) "Traffic" by Tom Vanderbilt, Random House Press (Chapter 4: Meet the World's Best Commuter: What We Can Learn From Ants, Locust and Crickets).

(2008) "Nature's Patterns: Flow" by Philip Ball, Oxford University Press (Chapter 5: Follow Your Neighbor: Flocks, Swarms and Crowds).

(2008) National Public Radio, "The physics of fish"

(2008) WNYC, The Brian Lehrer Show

(2007) New York Times, feature on my research by Carl Zimmer "From ants to people, an instinct to swarm", Science Times front cover

Television credits (IMDB)

(2010) National geographic, *Great Migrations*:

- Feast or Famine, scientific consultant
- Race to Survive, scientific consultant
- Need to Breed, scientific consultant

(2009) BBC, *Swarm: Nature's Incredible Invasions*:

- One Million Heads one Beautiful Mind, scientific consultant
- When Worlds Collide, scientific consultant

(2004) BBC, *Massive Nature*:

- The Trap, scientific consultant.

(2000) BBC, *Predators: Mass Attack*, scientific consultant and simulation developer