

# Brett Calcott—Curriculum Vitae

## Areas of Specialization and Competence

**Areas of Specialization**—Philosophy of Biology, Philosophy of Science, Computational Modeling

**Areas of Competence**—Philosophy of Cognitive Science, Philosophy of Psychology

## Academic Appointments

2014–2015: SFI/ASU Post-Doctoral Fellow, School of Life Sciences, Arizona State University.

2013–2014: Post-Doctoral Fellow, Center for Advanced Modeling, Emergency Medicine Department, Johns Hopkins University.

2010–2013: Australian Research Council Post-Doctoral Fellow, Australian National University. Project: *Evolvability and the Evolution of Complexity*.

Mar–Nov 2010: Post-Doctoral Researcher, Konrad Lorenz Institute for Evolution and Cognition Research. Project: *Biomorphs Upgraded: Modelling Facilitated Variation*.

2007–2009: Post-Doctoral Researcher, Cambridge-Templeton Consortium Grant, Australian National University. Project: *General Mechanisms Underlying Transitions in Complexity: An Interdisciplinary Approach*.

## Education

2003–2007: PhD in Philosophy: *Transitions in Biological Organisation*. Australian National University.

2001: B.A. Honours (1st Class), in Philosophy (minor: Computer Science). Victoria University, NZ.

## Publications

### Journal Articles—

Griffiths, P. E., Pocheville, A., Calcott, B., Stotz, K., Kim, H., Knight, Rob. (Forthcoming). *Measuring causal specificity*. Philosophy of Science.

Calcott, B., Levy, A., Siegal, M.L., Soyer O.S., Wagner, A. (2015). *Engineering and Biology: Counsel for a Continued Relationship*. Biological Theory 10: 50-59.

Frandsen, P. B., Calcott, B., Mayer, C., Lanfear, R. (2015). *Automatic selection of partitioning schemes for phylogenetic analyses using iterative k-means clustering of site rates*. BMC Evolutionary Biology.

Misof, Bernhard et al. (2014). *Phylogenomics Resolves the Timing and Pattern of Insect Evolution*. Science 346(6210): 763–67.

Calcott, B. (2014). *The Creation and Reuse of Information in Gene Regulatory Networks*. Philosophy of Science 81: 1–12.

Calcott, B. (2014). *Evolvability and Engineering*. Biology and Philosophy, 29(3), 293-313.

Lanfear R., Calcott B., Kainer D., et al. (2014). *Selecting Optimal Partitioning Schemes for Phylogenomic Datasets*. BMC Evolutionary Biology, 14(82).

Calcott B. (2013). *Why How and Why Aren't Enough: More Problems with Mayr's Proximate-Ultimate Distinction*. Biology and Philosophy, 28(5), 767-780.

- Lanfear, R., Calcott B., Ho, S., Guindon, S. (2012). *PartitionFinder: New Methods and Software to Select Partitioning Schemes for Phylogenetic Analyses*. *Molecular Biology and Evolution*, 29(6), 1695-701.
- Matthewson, J., Calcott, B. (2011). *Mechanistic Models of Population-level Phenomena*. *Biology and Philosophy*, 26 (5), 737-756.
- Calcott, B. (2009). *Lineage Explanations: Explaining How Biological Mechanisms Change*. *British Journal for the Philosophy of Science*, 60, 51-78.
- Calcott, B. (2008). *Assessing the Fitness Landscape Revolution*. *Biology and Philosophy*, 23(5), 639-657.
- Calcott, B. (2008). *The Other Cooperation Problem: Generating Benefit*. *Biology and Philosophy*, 23(2), 179-203.
- Calcott, B., Balcan, D., Hohenlohe, P. (2008). *A Publish-Subscribe Model of Gene-Regulation*. *PloS One*, 3(9), e3245.

#### Book Chapters—

- Calcott, B. (2013). *Why the Proximate–Ultimate Distinction is Misleading, and Why it Matters For Understanding the Evolution of Cooperation*. In Sterelny, K., Joyce, R., Calcott, B., Fraser B. (Eds.), *Cooperation and Its Evolution*, MIT Press.
- Calcott, B., Sterelny, K. (2011). *A Dynamic View of Evolution*. In Calcott, B., Sterelny, K. (Eds.), *The Major Transitions in Evolution Revisited*. MIT Press.
- Calcott, B. (2011). *Alternative Patterns of Explanation for Major Transitions*. In Calcott, B., Sterelny, K. (Eds.), *The Major Transitions in Evolution Revisited*, MIT Press.

#### Reviews, Commentaries, and Proceedings—

- Calcott, B. (2014). *Chaining Distinct Tasks Drives The Evolution of Modularity*. *Proceedings of Alife Conference 2014*. MIT Press.
- Calcott, B. (2013). *Engineering: Biologists Borrow More Than Words*. *Nature*, 502, 170–170.
- Calcott, B. (2010). *Wimsatt and the Robustness Family—Review of “Re-engineering Philosophy for Limited Beings”*. *Biology and Philosophy*, 26 (2), 281-293.
- Calcott, B. (2009). *Review of “Modeling Biology: Structures, Behaviors, Evolution”*. *Acta Biotheoretica*, 57(3), 383-387.
- Gardner, J., Marsack, P., Trueman, J., Calcott, B., Heinsohn, R. (2007). *Story-telling: An Essential Part of Science*. *Trends in Ecology and Evolution*, 22(10), 510.
- Calcott, B. (2005). *Review of “Fitness Landscapes and the Origin of Species”*. *Austral Ecology*, 30(5), 610-611.
- Calcott, B., Balcan, D., Hohenlohe, P. (2005). *Modeling the Evolution of Development*. *Collected Papers from the Santa Fe Summer School 2005*.

#### Grants and Awards

- PiCloud Academic Research Grant, *Optimal Partitioning Schemes for Phylogenetic Data*, with Rob Lanfear.
- Templeton World Charity Fund (3 year Post-Doctoral position), *The Causal Foundations of Biological Information*, with Paul Griffiths and Karola Stotz (declined).
- ARC Post-Doctoral Research Grant (3 year Post-Doctoral position), *Evolvability and the Evolution of Complexity*, with Kim Sterelny.
- Konrad Lorenz Institute for Evolution and Cognition, Post-Doctoral Research Position (6 months), *Biomorphs Upgraded: Modelling Facilitated Variation*.
- Cambridge-Templeton Consortium Grant (2 year Post-Doctoral Position). *General Mechanisms Underlying Transitions in Complexity: An Interdisciplinary Approach*, with Lindell Bromham (Biology) and Kim Sterelny (Philosophy).

Santa Fe Institute Summer School, 2005. 4-week, fully funded, summer school run by the Santa Fe Institute in Santa Fe, New Mexico.

Australian National University Ph.D Scholarship, 2003–2006.

## Teaching

### Courses—

Philosophy of Psychology, Australian National University 2012, Intermediate Undergraduate.

Introduction To Philosophy of Biology, Australian National University 2010. ANU Foundations Seminar for Graduate Students.

### Guest Lectures—

Evolution of Biodiversity, Australian National University 2009/2010, Intermediate Undergraduate.

## Supervision

Dissertation advisor, Australian National University: Holly Lawford-Smith (PhD 2012), Rachael Brown (PhD 2013), Adrian Currie (PhD 2014), Stephan Kubicki (continuing), David Kalkman (continuing).

Mentor for Paul Frandsen (2013) on “Google Summer of Code” project: *Extend PartitionFinder to Automatically Partition DNA and Protein Alignments*.

## Presentations

Arizona State University, April 2014. *Signaling, Information, and the Evolution of a Genetic Toolkit*. (invited)

University of Maryland, March 2014. *From Circuits to Signals: A New Perspective on Biological Information*. (invited)

Konrad Lorenz Institute for Evolution and Cognition Research, Altenberg, Austria, August 2013. Workshop on Evolutionary Systems Biology. *Evolution as an Engineering Puzzle*. (invited)

ISHPSSB Meeting, Montpellier, France, July 2013. *Mechanisms: How They Work, How They Change, and How the Way They Work Affects the Way they Change*.

Center for Advanced Modeling, Johns Hopkins University, May 2013. *Evolving Modularity in Gene Networks*. (invited)

Pittsburgh Center for Philosophy of Science, Lunchtime colloquium, January 2013. *Signalling and Information in Gene Regulation Networks*. (invited)

Philosophy of Science Association Meeting in San Diego, November 2012. *Gene Regulation as Signaling: the ‘Publish-Subscribe’ Model*.

University of Pennsylvania, Biology Department Ecolunch Seminar, February 2012. *Evolvability and Engineering*. (invited)

Sydney-ANU Philosophy of the Life Sciences Workshop, Bundanoon, Australia, December 2011. *What is a Genotype-Phenotype Map?*

The Sciences in Historical, Philosophical and Cultural Context Seminar Series, University of Vienna, Austria, October 2011. *Tinkering Revised: Evo-Devo as Diachronic Engineering*.

ISHPSSB Meeting, Salt Lake City, Utah, July 2011. *Tinkering Revised: Evo-Devo as Diachronic Engineering*.

Konrad Lorenz Institute for Evolution and Cognition Research, Alternberg, Austria, April 2011. *Evolving Modularity via Plasticity*.

University of Sydney Philosophy Seminar Series, October 2010. *Modularity in Engineering and Biology*. (invited)

University of Wollongong Philosophy Seminar Series, September 2010. *Evolvability as Inductive Learning*. (invited)

Philosophy of Biology at Dolphin Beach Conference, Year 4, 20-22nd August, 2010. *Evolvability as Inductive Learning*.

Australasian Association of Philosophy Meeting 2010 (at UNSW) 4-9th July 2010. *Principled Tinkering: Evo-Devo as Engineering*.

Sydney-ANU Philosophy of the Life Sciences Workshop in Bundanoon, 17th September, 2010. *Spoilt Broth & Light Work: Differences in the Structure of Cooperation*.

Departmental Seminar Series, Philosophy Program, RSSH, ANU April 29th, 2010. *Modularity & Evolvability*.

Philosophy of Biology at Dolphin Beach, Australia, 2009. *Evo-Devo as Engineering*.

ISHPSSB Meeting in Brisbane, 2009. *Models, Metaphors, and Fitness Landscapes*.

Philosophy Program, RSSH, Australian National University, 2009. *Explaining the Evolution of Complexity*.

Evolution of Cooperation and Cognition Workshop, France, 2008. *Constraining Folk Psychology*.

Institut d'Histoire et de Philosophie des Sciences et des Techniques, Paris, France, 2008. *Patterns of Explanation in the Major Transitions*. (invited)

7th Annual Conference in Philosophy & Biology, Duke University, 2008. *Patterns of Explanation in the Major Transitions*. (invited)

Tempo & Mode Public Seminar, School of Botany & Zoology, Australian National University, 2007. *Patterns of Explanation and Evo-Devo*.

ISHPSSB Meeting at the University of Exeter, 2007. *Two Ways That Modules Enable Evolvability*.

Workshop on "Major Transitions Revisited" at the Konrad Lorenz Institute, Altenberg, Austria, 2007. *Internal Signaling and the Division of Labour*.

Seminar Series, Philosophy Program, RSSH, Australian National University, 2007. *The Mixed Blessing of Cooperation and the Evolution of Biological Organisation*.

Australasian Association of Philosophy (New Zealand Division) Meeting, 2006. *Modelling and Mechanistic Science* (with John Matthewson).

Australasian Association of Philosophy (New Zealand Division) Meeting, 2006. *The Cambrian Explosion and the Evolution of Life* (with Kim Sterelny).

Institut d'Histoire et de Philosophie des Sciences et des Techniques, Paris, France, 2006. *Evolutionary Novelties and Lineage Explanations*. (invited)

Causation & Dispositions Conference at Sydney University, 2006. *Explanatory Generalizations: Deep or Broad?*.

Philosophy of Science Association Meeting in Vancouver, 2006. *The Cambrian Explosion and the Evolution of Life*. (with Kim Sterelny).

Australasian Association of Philosophy Meeting, Canberra, Australia, 2006. *Manipulating Individuals and Manipulating Populations*.

Philosophy of Biology at Dolphin Beach (Workshop), Australia, 2006. *Levels, Transitions, and Interactions*.

Philosophy Program, RSSH, Australian National University, 2005. *Lineage Explanations in Macroevolution*.

ISHPSSB Meeting at the University of Guelph, 2005. *Selection, Variation, and Development in Major Evolutionary Transitions*.

Australasian Association of Philosophy Meeting, South Molle Island, Australia, 2004. *Richer Models for Evolutionary Transitions*.

## Professional Service

### Organisations—

Co-founder of the Sydney-ANU Philosophy of the Life-Sciences Meetings.

Co-founder of Tempo & Mode: Centre for Macroevolution & Macroecology, a cross-disciplinary centre at the Australian National University.

### Workshops—

Co-organiser of *The Major Transitions Revisited*, held at the KLI institute in Altenberg, Austria, 2007.

Organiser of *Evolution of Signalling*, held at the Australian National University, 2008.

Co-organiser of *The Evolution of Cognition and Cooperation* Workshop, held in Provence, France, 2008.

### Reviewing—

I review articles for major journals in my field including *Biology and Philosophy*, *Biological Theory*, *Philosophy of Science*, *British Journal for Philosophy of Science*, *Synthese*, *Acta Biotheoretica*, *Artificial Life*, *Journal of Political Philosophy*, and *Evolution*.

## Professional Experience

From 1987 to 2003, I was a professional software developer in New Zealand and France, consulting to many government departments and corporations. I worked extensively in the banking industry, developing large-scale financial software for trading rooms, and also in the bibliographic publishing industry, where I developed a number of full-text search engines.