

Benjamin C. Jantzen

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Current appointments

- 2018-present *Associate Professor of Philosophy*, Philosophy Department, Virginia Tech
- 2018-present *Associate Professor of Computer Science, by courtesy*, Department of Computer Science, Virginia Tech

Areas of specialization

Logic of Discovery; Philosophy of Biology; Philosophy of Physics; Philosophy of Science

Prior appointments

- 2011-2018 *Assistant Professor of Philosophy*, Philosophy Department, Virginia Tech
- 2015-2018 *Assistant Professor of Computer Science, by courtesy*, Department of Computer Science, Virginia Tech
- 2010-2011 Coordinator of Graduate Student Programs, Carnegie Mellon University

Education

- 2010 Ph.D. in Logic, Computation, & Methodology, Carnegie Mellon University
- 2006 M.A. in Philosophy, Carnegie Mellon University
- 2003 M.S. in Physics, Cornell University
- 1999 B.S. in Biology, B.S. in Physics, with High Distinction and with Honors in Biology, The Pennsylvania State University

Grants & funding

2015-2020	B. Jantzen (PI), CAREER: Automated scientific discovery and the philosophical problem of natural kinds (NSF), \$443,427
2017-2019	N. Abaid (PI) & B. Jantzen (co-PI), EAGER: Dynamical kinds in multi-agent systems: A philosophical understanding of collective behaviors (NSF), \$123,691
2018	B. Jantzen (PI), N. Abaid (co-PI), A. Leonessa (co-PI), "Automated discovery of brain states from noninvasive EEG data," Data & Decisions seed grant (Virginia Tech), \$25,000
2018	B. Jantzen (PI), CLAHS Grant-writing Incentive Grant (Virginia Tech), \$5,000
2017	B. Jantzen (PI), CLAHS Grant-writing Incentive Grant (Virginia Tech), \$5,000
2013	B. Jantzen (PI), CLAHS Grant-writing Incentive Grant (Virginia Tech), \$5,000
2013	B. Jantzen (PI), Virginia Tech Mentoring Microgrant, \$1,500
2012	B. Jantzen (PI), CLAHS Humanities Summer Stipend (Virginia Tech), \$4,000

Fellowships & awards

2012-present	Sigma Xi, Full Member
2010	CMU Graduate Student Teaching Award
2007-2010	CMU Philosophy Department Dissertation Fellowship
2004-2006	CMU Philosophy Department Fellowship
2005	Posner Internship at Carnegie Mellon University Libraries
1999-2001	NSF Graduate Fellowship competition Honorable Mention
1998-1999	Barry M. Goldwater Scholar (national award)

Publications

JOURNAL ARTICLES & BOOK SECTIONS

forthcoming	Jantzen, B. "Symmetry and Causation: A General Theory of Biological Individuality," <i>Minnesota Studies in Philosophy of Science</i> .
forthcoming	Hashimoto, A., N. Abaid, S. Roy, B. Jantzen, C. Shea-Blymyer. "Differentiation of collective behavior based on automated discovery of dynamical kinds," <i>Proceedings of the ASME 2018 Dynamic Systems and Control Conference</i> .
forthcoming	Jantzen, B. "Dynamical symmetries and model validation," <i>ACMES: Algorithms and Complexity in Mathematics, Epistemology, and Science</i> , in <i>Fields Institute Communications</i> .
2018	Roy, S. and B. Jantzen. "Detecting causality using symmetry transformations," <i>Chaos</i> 28 (075305): 1-11.
2017	Jantzen, B. "Entities Without Identity: A Semantical Dilemma," <i>Erkenntnis</i> . doi: 10.1007/s10670-017-9958-3
2017	Jantzen, B. "Kinds of process and the levels of selection," <i>Synthese</i> . doi: 10.1007/s11229-017-1546-1 .

- 2017 Jantzen, B. "Cyberwarfare," in Joseph Pitt & Ashley Shew (ed.), *Spaces for the Future: a Companion to the Philosophy of Technology*, Routledge. (invited)
- 2017 Jantzen, B. "Dynamical Kinds and their Discovery," *Proceedings of the UAI 2016 Workshop on Causation: Foundation to Application* (<http://ceur-ws.org/Vol-1792/paper2.pdf>).
- 2016 Jantzen, B. "Discovery without a 'logic' would be a miracle," *Synthese* 193 (10): 3209–3238. doi:[10.1007/s11229-015-0926-7](https://doi.org/10.1007/s11229-015-0926-7) (First Online: 03 October 2015).
- 2015a Jantzen, B., D. Mayo, L. Patton (2015) "Ontology & Methodology," *Synthese* 192 (11):3413–3423.
- 2015b Jantzen, B. (2015) "Projection, symmetry, and natural kinds," *Synthese* 192 (11): 3617–3646. doi:[10.1007/s11229-014-0637-5](https://doi.org/10.1007/s11229-014-0637-5)
- 2014 Jantzen, B. (2014). "Piecewise Versus Total Support: How to Deal with Background Information in Likelihood Arguments," *Philosophy of Science* 81 (3): 313–331.
- 2012 Jantzen, B. (2012). "Peirce on miracles: the failure of Bayesian analysis" in Jake Chandler and Victoria Harrison (eds.), *Probability in the Philosophy of Religion*, Oxford University Press.
- 2011a Jantzen, B. (2011). "An awkward symmetry: The tension between particle ontologies and permutation invariance," *Philosophy of Science* 78(1): 39–59.
- 2011b Jantzen, B. (2011). "No two entities without identity," *Synthese* 181(3): 433–450. (First Online: 22 February 2010)
- 2009 Jantzen, B. (2009). "Peirce on the method of balancing 'likelihoods'." *Transactions of the Charles S. Peirce Society* 45(4): 668–688.
- 2008a Jantzen, B. and D. Danks (2008). "Biological codes and topological causation." *Philosophy of Science* 75: 259–277.
- 2008b Jantzen, B. and T. Eisner (2008). "Hindwings are unnecessary for flight but essential for execution of normal evasive flight in Lepidoptera." *Proceedings of the National Academy of Sciences* 105(43): 16636–16640.
- 2002 Koch, S. J., A. Shundrovsky, B. C. Jantzen, and M. D. Wang (2002). "Probing protein-DNA interactions by unzipping a single DNA double helix." *Biophysical Journal* 83(2):1098–1105.

BOOKS

- 2014 Jantzen, B. (2014), *An Introduction to Design Arguments*, New York: Cambridge University Press, ISBN 978-0521183031

NEWSPAPER & MAGAZINE ARTICLES

- 2017 Jantzen, B. (Volume 1, 2016–2017), "How to use robot scientists to reimagine the world," *Illuminations*
- 2016 Jantzen, B. (1st Quarter 2016), "The philosophy of science," *The Philosophers' Magazine* 72:63–64
- 2015 Jantzen, B. (1st Quarter 2015), "The Fine Tuning Argument Unmasked," *The Philosophers' Magazine* 68:49–55
- 2006 Jantzen, B. (23 August, 2006), "Air displacement keeps butterflies, and other things, in the air," *The Ithaca Journal*

BROADCAST MEDIA

- 2016 “Algorithm of Discovery - Defining What Isn’t,” *Pulse of the Planet* (radio).
2016 “Algorithm of Discovery – A New Way of Seeing the World,” *Pulse of the Planet* (radio).
2016 “Algorithm of Discovery – New Ideas From Computers,” *Pulse of the Planet* (radio).

TECHNICAL REPORTS

- 2003 Jantzen, B. C. and C. W. Henoch (2003). “A full-scale investigation of the wake produced by surface-piercing masts: Baseline measurements and verification of technique.” NUWC-NPT Technical Memo 03-129.
2002 Jantzen, B. C. and M. Genco (2002). “A towing tank investigation of production of white-water wake by surface-piercing masts.” NUWC-NPT Technical Memo 02-122.

Professional presentations

PEER-REVIEWED/REFEREED

- 2017 “A brief and whiggish history of algorithmic discovery,” *4th International Conference on the History and Philosophy of Computing, Brno, Czech Republic*
2015a “Natural kinds and automated scientific discovery,” *15th Congress of Logic, Methodology and Philosophy of Science, Helsinki, Finland*
2015b “Dynamical kinds and the reliability of simulations,” *Algorithms and Complexity in Mathematics, Epistemology and Science, London, Canada*
2014a “The Field Guide Approach to Teaching Argument Analysis,” *AAPT session at the Eastern Division American Philosophical Association (APA) Meeting*
2014b “Why talk about ‘non-individuals’ is meaningless,” *Philosophy of Science Association Biennial Meeting*
2013a “Dynamical kinds and ecological theory,” *Biennial Meeting of the International Society for the History, Philosophy, and Social Studies of Biology (ISHPSSB)*
2013b “Symmetry, Dynamics, and the Levels of Selection,” *International Conference on Evolutionary Patterns, Lisbon, Portugal*
2013c “Symmetry, Dynamics, and the Levels of Selection,” *Philosophy and Theory in Biology Young Investigator’s Symposium*
2012a “Piecewise Versus Total Support: How to Deal with Background Information in Likelihood Arguments,” *Philosophy of Science Association Biennial Meeting*
2012b “Symmetry and Causation: A General Theory of Biological Individuality,” *Philosophical Perspectives on Causal Reasoning in Biology, Part II, Minnesota Center for the Philosophy of Science*
2011 “The Spatial Objects Interpretation of Quantum Mechanics,” *Boulder Conference on the History and Philosophy of Physics*
2010 “Comments on Nagelian reduction and mathematical assimilation,” *10th Annual Pitt/CMU Graduate Student Philosophy Conference*
2009a “Quantum indeterminism and microevolution,” *Biennial Meeting of the International Society*

for the History, Philosophy, and Social Studies of Biology (ISHPSSB)

- 2009b “Peirce on miracles: the failure of Bayesian analysis,” *Formal Methods in the Epistemology of Religion Conference*
- 2009c “Background information as epistemic intervention: Comments on Matt Kotzen’s ‘Selection biases in likelihood arguments’,” *Formal Epistemology Workshop*
- 2008 “Points and permutations,” *Philosophy of Science Association Biennial Meeting*

INVITED

- 2017 “A brief and whiggish history of algorithmic discovery,” *STS seminar series, Virginia Tech*
- 2016a “Scientific variables: New answers, new questions,” *Caltech*
- 2016b “Discovering Dynamical Kinds,” *Mind, Technology, and Society talk series, UC Merced*
- 2016c “Automated Scientific Discovery,” *Virginia Tech Carillion Research Institute*
- 2016d “Discovering Dynamical Kinds,” *Causation: Foundation to Application Workshop, Uncertainty in Artificial Intelligence 2016*
- 2016e “How different can identity be?,” *Society for Realist/Antirealist Discussion group session, APA Pacific 2016*
- 2016f “Discerning Dynamical Structure,” *Dept. of Computer Science, Graduate Seminar, Virginia Tech*
- 2016g “The ethics integrative outcome,” *Pathways Scholars working group, Virginia Tech*
- 2015a “Finding Natural Kinds,” *Philosophy Colloquium, Virginia Tech*
- 2015b “An Introduction to Design Arguments,” *Visible Scholarship Initiative, Virginia Tech*
- 2015c “Preparing the Broader Impacts Statement for Your NSF CAREER Proposal,” *Panelist, Citizen Scientist Seminar, Virginia Tech*
- 2015d “Causes, kinds, and variables: On the eve of revolution,” *Department of Philosophy 30th Anniversary Celebration, Carnegie Mellon University*
- 2015e “Cyberwarfare: Conflict and control in a computerized world,” *STS colloquium, Virginia Tech*
- 2015f “Robot scientists: Automated discovery of causal structures and inductively useful categories,” *ECE colloquium, Virginia Tech*
- 2015g “An Introduction to Design Arguments,” *ASPECT Books at Newman Library, Virginia Tech*
- 2015h “Integrative ethics beyond the case study,” *Pathways Summer Institute, Virginia Tech*
- 2014 “Semantic Phenomenalism: What Mill meant, Helmholtz heralded, and Ayer almost got right,” *University of Virginia*
- 2013a “The Argument Guide,” *Panelist, Open Educational Resources & Innovative Learning Objects: Exploring Opportunities Workshop, Virginia Tech*
- 2013b “The Algebraic Conception of Natural Kinds,” *Ontology & Methodology Conference, Virginia Tech*
- 2013c “Wigner’s World: Natural Kinds Reconceived,” *Faculty Keynote Speaker, Virginia Tech Graduate Philosophy Conference*
- 2006a “Biological codes,” *Lunchtime Technical Talk Series (Naval Undersea Warfare Center, Div. Newport)*
- 2006b “Protean probability: How a mathematical theory of probability wrestled answers from randomness,” *Posner Center of Carnegie Mellon University (at the opening of my exhibit)*

Other research

- 2016-present Team member, “A synthesis to identify how metacommunity dynamics mediate community responses to disturbance across the ecosystems represented in the LTER network” (NSF funded)
- 2016 Invited participant, Biological Collections as a Resource for Technical Innovation (NSF funded)

Teaching

VIRGINIA TECH

- F-16-18 Modern Logic & Its Development
- S-16 Minds & Machines
- S-12,13,15 Advanced Topics in the Philosophy of Science (graduate seminar)
- F-11,S-15 Language and Logic
- F-12,13,16-18 Symbolic Logic (core graduate seminar)
- S-12,17 Reason and Revolution in Science
- F-11-13,15,17;S-18 Philosophy of Biology (mixed graduate/undergraduate)

CARNEGIE MELLON UNIVERSITY

- S-09,S-11 Life, the Universe, and God (course creator)
- F-10 Revolutions in Science
- S/Su-07,Su-08 What Philosophy Is
- S-07 Honors section of “What Philosophy Is”

CORNELL UNIVERSITY

- S-00 Fundamentals of Physics II—Electromagnetism (lab instructor)

Service to the profession

INTERNAL

- 2012-present Senior Fellow, West Ambler Johnston Residential College (Virginia Tech)
- 2012-present Member, Graduate admissions committee
- 2018-2019 Invited member, Open Educational Resources (OER) Committee
- 2018-2019 Member, CLAHS Dean search committee (Virginia Tech)
- 2017-2019 Member, Strategic Planning Committee (Virginia Tech)
- 2016-2017 Member, Intelligent Infrastructure and Human-Centered Communities (IIHCC) Faculty Design Team
- 2016-2017 Member, Data Analytics and Decision Sciences (DADS) Faculty Design Team
- 2017 Faculty liaison, Future Faculty Development Program (Virginia Tech)
- 2016 Participant, Pathways Rubric Development Workshop

2016	Member, Destination Areas Round Table
2016	Invited member, Smart Human Centered Infrastructure Steering Committee
2016	Panelist, NSF CAREER info session for pre-tenure faculty
2016	Panelist, PDI NSF CAREER award panel discussion
2014-2016	Virginia Tech Pathways Faculty Scholar
2016	Contributor, Open Education Week video testimonials
2012-2016	Member, CLAHS faculty council
2015-2016	Member, Faculty search committee (Virginia Tech)
2015	Member, CLAHS Summer Stipend review panel (Virginia Tech)
2014-2015	Member, Head search committee (Virginia Tech)
2013	Member, Faculty search committee (Virginia Tech)
2012-2013	Member, Faculty search committee (Virginia Tech)
2011-2013	Member, Library committee
2012	Usher at Virginia Tech University Commencement
2011-2012	Member, Graduate committee
2011-2012	Member, Faculty search committee (Virginia Tech)
2010	Assistant for the Carnegie Mellon Summer School in Formal Epistemology
2010-2011	Coord. of Grad. Student Programs, Eberly Center for Teaching Excellence (CMU)
2007-2011	Member, Faculty Teaching Evaluation Committee (CMU)
2007-2010	Teaching Fellow, Eberly Center for Teaching Excellence (CMU)
2007	Instructor and co-developer, Undergraduate philosophy writing workshops (CMU)
2007	Member, Graduate admissions committee (CMU)
2005	Member, Faculty search committee (CMU)
2005	Member, Selection committee for Ryan Award for Meritorious Teaching (CMU)
1999	Member, Search committee for Assoc. Dean of Schreyer's Honors College, Penn State

EXTERNAL

2016	Session chair, Biennial Meeting of the Philosophy of Science Association, Atlanta, GA
2013-2015	Guest editor, Synthese Special Issue: "Ontology & Methodology"
2003-2005	Judge, Office of Naval Research science fair outreach team
2001-2002	Instructor and course author, Graduate Student School Outreach Program, Cornell University
1999-2000	Mentor, Cornell "Microworld" high school teacher outreach program

CONFERENCE & WORKSHOP ORGANIZATION

2016	Creator, organize, instructor, "Philosophy & Physical Computing" graduate summer workshop
2012-2013	Conference Organizer for "Ontology & Methodology" at Virginia Tech
2007-2008	Chair, 10th Annual Pitt-CMU Graduate Student Philosophy Conference
2006-2007	Organizer, 9th Annual Pitt-CMU Graduate Student Philosophy Conference

JOURNAL & BOOK REVIEWING

Australasian Journal of Philosophy, BioScience, British Journal for Philosophy of Science, Cambridge University Press, Erkenntnis, Ergo, European Journal of Analytic Philosophy, European Journal for Philosophy of Science, Fields Institute Communications, Mind, Minds and Machines, Oxford University Press, Perspectives on Science, Philosophy of Science, Routledge, Southern Journal of Philosophy, Synthese, Systems Research and Behavioral Science, Transactions of the Charles S. Peirce Society

CONFERENCE REVIEWING

2017	Southern Society for Philosophy and Psychology
2016	Neural Information Processing Systems
2013	"Ontology & Methodology," Virginia Tech (program committee)
2010	Canadian Philosophical Association Conference

GRANT REVIEWING

2018	Israeli Science Foundation
2016	Open Education Initiative Faculty Grants
2016	National Geographic Society

Outreach

2016-present	Creator, administrator of "Robot Scientist," (annual event for early secondary school students), <i>Western Virginia Museum of Science, Roanoke, VA</i>
2017-2018	Coach, Harding Avenue Elementary Robotics Club (for children in 1st - 4th grade)

Dissertation

How Symmetry Undid the Particle: A Demonstration of the Incompatibility of Particle Interpretations and Permutation Invariance

Dissertation committee:

Mara Harrell (chair), John Earman (University of Pittsburgh), Jeremy Butterfield (University of Cambridge)

Scientific research experience

2004	<i>Johnson & Johnson Fellow in Chemical Ecology at Cornell University:</i> collaborated with Thomas Eisner on a series of experiments involving insect flight
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2003-2007 *Scientist at the Naval Undersea Warfare Center, Division Newport:*
 managed research projects and conducted experiments in the hydrodynamics branch

1999-2003 *Graduate Research Assistant at Cornell University:*
 worked with Michelle Wang in biophysics for two years managing a project intended to integrate molecular motors with nanofabricated devices; worked with Jane Wang in fluid dynamics for one year investigating insect flight (the subject of my M.S. thesis in physics)

2002 *Intern at the Naval Undersea Warfare Center:*
 designed and executed a study of ship wakes using a small tow tank; worked with multiple teams in the department on a variety of naval systems projects

1999 *Trainee in the Educational Research in Radio Astronomy program:*
 underwent two weeks of intensive training in techniques of radio astronomy at the National Radio Astronomy Observatory in Greenbank, WV

1997-1998 *Research Assistant at the Pennsylvania State University:*
 performed independent theoretical investigation of butterfly flight mechanics and ran a variety of experimental systems in the laboratory of James Marden

1997 *Paleontology Field Assistant for the Royal Tyrrell Museum*
 prospected, excavated, and prepared fossils at a remote Alberta site

Training and faculty development

2012-2013 Proposal Development Institute, Virginia Tech
 2009 Geneva Summer School in the Philosophy of Physics

Professional organizations

American Association for the Advancement of Science
 American Philosophical Association
 Association for Computing Machinery
 International Society for the History, Philosophy, and Social Studies of Biology
 Philosophy of Science Association
 Sigma Xi