

## Education

Ph.D. Science Education, Stanford University (2016)

Dissertation title: *An Experimental Exploration of How Text-Based Instruction in School Biology Affects Belief in Genetic Essentialism of Race in Adolescent Populations*

Dissertation Committee: Jonathan Osborne, Bryan Brown, Noah Rosenberg, Janet Carlson & Carol Dweck. Advisors: Bryan Brown and Jonathan Osborne

M.Sc. Biology, Stanford University (2016)

Advisor: Noah Rosenberg

Master of Arts in Teaching, University of San Francisco (2009)

Bachelor of Arts in Biology, The Colorado College (2001)

## Current Appointment

Research Scientist, The Biological Sciences Curriculum Study (July 2016-Present)

## Research and Teaching Awards

1. *National Science Teacher Association Research Worth Reading Award* (2017): An award given to a peer reviewed science education manuscript that is relevant to the practice of science education.
2. *Stanford Interdisciplinary Graduate Fellowship* (2014-2016): The Stanford Interdisciplinary Graduate Fellowship (SIGF) Program is a competitive university-wide program that awards a three-year fellowship (\$37,000 per year plus \$40,000 in tuition) and a \$3000 dissertation grant to outstanding doctoral students engaged in interdisciplinary research.
3. *Herbst Award for Teaching Excellence* (2009): A \$2000 award given each year to one teacher in San Francisco Independent and Parochial Schools for demonstrating a commitment to excellence in the classroom.

## Grant Awards and Proposals Under Development

### *Funded Proposals*

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1. Principal Investigator: *Towards a More Human(e) Genetics Education: Exploring How Knowledge of Genetic Variation and Causation Affects Racial Bias Among Adolescents*. Click [here](#) for a description (NSF EHR CORE-1660985, USD \$1,299,037).

### *Proposals That Have Received Questions*

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2. *Collaborative Research: Honoring the complexity of genetics – Exploring how the learning of multifactorial genetics affects belief in genetic determinism* (in review for NSF IUSE, USD \$1.19 million)

### *Proposals Still Under Review*

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3. *Collaborative Research: Exploring how learning about the genetics of sex differences impacts genetic essentialism and STEM belonging and interest* (in review for NSF CORE, USD \$2.49 million)

**Publications**

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*First Author Peer Reviewed Manuscripts:*

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1. **Donovan, B. M.**, Weindling, M., Salazar, B., Duncan, A., Stuhlsatz, M., Keck, P. (in review) Genomics Literacy Matters: Supporting the development of genomics literacy through genetics education could reduce cognitive forms of racial prejudice. *Journal of Research in Science Teaching*.
2. **Donovan, B. M.**, Semmens, R., Keck, P., Brimhall, E., Busch, K. C., Weindling, M., Duncan, A., Stuhlsatz, M., Buck Bracey, Z., Bloom, M., Kowalski, S., Salazar, B. (2019) Towards a More Humane Genetics Education: Learning about the social and quantitative complexities of human genetic variation research could reduce racial bias in adolescent and adult populations. *Science Education*.
3. **Donovan, B.M.**, Stuhlsatz, M., Edelson, D.C., Buck Bracey, Z.B. (2019) Gendered Genetics: How reading about the genetic basis of sex differences in biology textbooks could affect beliefs associated with science gender disparities. *Science Education*.
4. **Donovan, B. M.** (2017) Learned inequality: Racial labels in the biology curriculum can affect the development of racial prejudice. *Journal of Research in Science Teaching*, 54(3), 379-411.
5. **Donovan, B. M.** (2016). Framing the genetics curriculum to support social justice: An experimental exploration of how the biology curriculum influences students' beliefs about the racial achievement gap. *Science Education*. 100(3), 586-616.
6. **Donovan, B. M.** (2015a). Putting humanity back into the teaching of human biology. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*. 52, 65-75.
7. **Donovan, B. M.** (2015b). Reclaiming race as a topic of the United States biology curriculum. *Science Education*. 99(6) 1092-1117.
8. **Donovan, B. M.** (2014). Playing with fire? The impact of the hidden curriculum in school genetics on essentialist conceptions of race. *Journal of Research in Science Teaching*, 51(4), 462-496.
9. **Donovan, B. M.**, Moreno Mateos, D., Osborne, J. F., & Bisaccio, D. J. (2014). Revising the Economic Imperative for US STEM Education. *PLoS Biology*, 12(1), e1001760.

*Book Chapters, Book Reviews, and Curriculum:*

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10. **Donovan, B. M.**, Salazar, B., Weindling, M. (forthcoming) How can we make genetics education more humane? *Genetics Education for the 21<sup>st</sup> Century*.
11. **Donovan, B.M.** (2018). Looking backwards to move biology education toward its humanitarian potential: A review of Darwinism, Democracy, and Race. *Science Education*.
12. Osborne, J., **Donovan, B. M.**, Henderson, J. B., MacPherson, A. C., & Wild, A. (2016). *Arguing from Evidence in Middle School Science: 24 Activities for Productive Talk and Deeper Learning*. Thousand Oaks: CA: Corwin Press.

*Contributing Author:*

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13. Brown, B. A., **Donovan, B.**, Wild, A. (2019) Language and Cognitive Interference: How using complex science language limits cognitive performance. *Science Education*.
14. Patterson, A., Roman, D., Friend, M., Osborne, J., **Donovan, B.**, (2018). Reading for Meaning: The Foundational Knowledge Every Teacher of Science Should Have. *International Journal of Science Education*. pp. 1-17
15. Smith, E., Romero, C., **Donovan, B.**, Herter, R., Paunesku, D., Cohen, G. Dweck, C.S., Gross, J.J. (2017). Emotion Theories and Adolescent Well-Being: Results of an Online Intervention. *Emotion*.

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**Publications Continued**

16. Brown, B. A., Henderson, J. B., Gray, S., **Donovan, B.**, Sullivan, S., Patterson, A., & Wagstaff, W. (2015). From description to explanation: An empirical exploration of the African-American pipeline problem in STEM. *Journal of Research in Science Teaching*.
17. Brown, B. A., Henderson, J. B., Gray, S., **Donovan, B.**, & Sullivan, S. (2013). From Access to Success: Identity Contingencies & African-American Pathways to Science. *Higher Education Studies*, 3(1) 13pp.

**Higher Education Teaching**

1. Teaching Assistant, EDUC 267e, Development of Scientific Reasoning and Knowledge, Stanford Teacher Education Program, Stanford University (2015): Co-taught elementary science curriculum and instruction.
2. Teaching Fellow, EDUC 267a-c, Curriculum and Instruction in Science, Stanford Teacher Education Program, Stanford University (2013-2014): Taught middle and high school science curriculum and instruction.
3. Teaching Assistant, EDUC 267a-c, Curriculum and Instruction in Science, Stanford Teacher Education Program, Stanford University (2011-2012): Co-taught with professors Bryan Brown and Jonathan Osborne.
4. Introductory Statistics Instructor, Gateways to Science and Mathematics Project, Stanford University (Summer 2012): Project to increase African-American participation in STEM fields and STEM Education.

**K-12 Science Teaching and Informal Science Teaching**

1. Middle School Science Teacher, The San Francisco School (2006-2011): Taught seventh grade life science and eighth grade physical science in an urban K-8 school committed to social and environmental justice. I wrote and then taught a curriculum using the teaching for understanding framework to address: (i) biodiversity loss, ecology, environmental justice, and indigenous rights; (ii) evolution, genetics, scientific racism, and human genetic diversity; (iii) the chemistry and physics of climate change; and (iv), the physics of water bottle rockets.
2. High School Science Teacher, Mission High School (Summer 2006).
3. Elementary and Middle School Science Teacher, The Town School for Boys (2004-2006).
4. Elementary Level Substitute Teacher, The Prospect Sierra School (2003-2004).
5. Field Instructor, Aspen Achievement Academy (2001-2002): Taught geology and ecology to “at-risk” high school students while backpacking with them around Capitol Reef National Park.
6. Mountaineering instructor, Wild Quest (1999-2000): Taught rock climbing, mountaineering, and environmental science on 3-week backpacking trips in Wyoming for high school students.

**Advising**

1. BSCS Science Learning, (September 2017 – Present): Mentoring three research assistants
2. Stanford University (2012-2015): Co-advised an undergraduate during his honor’s thesis.

## Research Training

1. Research Scientist, Teaching Students to Reason about Variation and Covariation in Data: What Do We Know and What Do We Need to Find Out? BSCS (September 2019 – Present): In this NSF CORE, we are conducting a landscape review and statistical meta-analysis of research that explores practices for teaching quantitative reasoning through school science. *PI: Sue Kowalski*
2. Research Scientist, Collaborative Research: Extending and Investigating the Impact of the High School Model-Based Educational Resource (MBER), BSCS (August 2018 – Present): In this DRK-12, we explore the impact of the MBER program on students' model-based reasoning in biology via a cluster-randomized trial *PI: Chris Wilson*
3. Research Scientist, Measuring scientific argumentation, BSCS (August 2016 – Present): This NSF CORE project applies machine learning to the measurement of students' ability to construct explanations and engage in argument from evidence. *PI: Chris Wilson*
4. Research Scientist, Measuring science teacher PCK, BSCS (August 2016 – Present): This NSF PRIME funded project applies machine learning to the measurement of science teacher pedagogical content knowledge. *PI: Chris Wilson*
5. Research Scientist, Scientific Data in Schools: Measuring the Efficacy of an Innovative Approach to Integrating Quantitative Reasoning in Secondary Science, BSCS (January 2017 – Present): This NSF funded collaboration between BSCS and Michigan State University explores whether bringing real-world, scientific data into middle and high school classrooms can impact students' quantitative reasoning in science. *PI: Molly Stuhlsatz*
6. Research Assistant, Catalyzing Comprehension through Discussion and Debate, Stanford Graduate School of Education, (2012 to 2016): Little is known about how science educators teach reading in science, or whether the practice of teaching reading in science is a malleable factor that can be influenced through professional development interventions. This IES project explored how science teachers conceptualized the teaching of reading and enacted it in their classrooms through interviews and video-based analyses of teaching. *PI: Jonathan Osborne.*
7. Research Assistant, Improving Academic Achievement by Teaching Growth Mindsets about Emotion, Stanford Department of Psychology (2012 to 2014): Disruptive emotions such as anger, sadness, and stress can impede academic performance in school through a variety of different mechanisms. The primary goal of this project was to develop and test a curricular intervention capable of improving the academic performance of middle school students by teaching them that difficult emotions are malleable and can be effectively regulated by changing your thinking, changing your attention, or changing your situation. *PIs: Carol Dweck, Geoff Cohen, & James Gross.*
8. Research Assistant, Insect Flux Across Ecotones, Stanford Department of Biology (2013).
9. Forest Ecologist & Wildlife Biologist, Southwest Research, Colorado & Utah (2003).
10. Forest Ecologist, Rocky Mountain Research Station, United States Forest Service (2002-2003).

### **Professional Developments Offered to Science Teachers**

- Donovan, B. M., Weindling, M., Salazar, B. (2019). Teaching Genetic Variation and Multifactorial Genetics to Reduce Racism. I developed and taught this four-day institute for fifteen teachers participating in my NSF grant. Held at BSCS Science Learning.
- Donovan, B. M., Strode, P., Keck, P. (2018). Playing with Fire? How We Perpetuate Biological Beliefs about Race in the Classroom and How to Avoid it. *Workshop offered at the Annual Meeting of the National Association of Biology Teachers in San Diego, CA.*
- Donovan, B. M., Strode, P., Keck, P. (2018). Engaging students in model-based learning about multifactorial genetics. *Workshop offered at Boulder Valley School District, CO.*
- Co-teacher, *Reading to Learn in Science*, Stanford Graduate School of Education (2012-2014): I co-designed and co-taught a two-year professional development for in-service elementary and middle school teachers that developed their pedagogical content knowledge for teaching reading in science. For more details see <http://serpmedia.org/rtl/index.html>
- Osborne, J., & Donovan, B. M. (2014). Supporting Literacy in Science Instruction. *Workshop offered at the National Science Teacher Association Conference, Long Beach, CA.*
- Donovan, B.M., & Friend, M. (2013). Read It, Write It, Talk It: Practical Strategies for Addressing Literacy Development in Science Instruction. *Workshop offered at the National Science Teacher Association Conference, San Antonio, TX.*
- Mentor Teacher in Science Education, The Breakthrough Collaborative (Summer 2011): The Breakthrough Collaborative intends to: (i) inspire undergraduates to pursue careers in education; (ii) support low-income students on their path to college. I mentored and supervised a cohort of four undergraduates as they taught science.
- Donovan, B.M. (2011). Becoming a bad scientist. *Workshop offered at the annual meeting of the California Association of Independent Schools Northern Regional Meeting, Oakland, CA.*
- Donovan, B.M. (2011). Educating the heart of a scientist: Field-based science instruction for environmental justice. *Workshop offered at the Bay Area Teacher Development Collaborative, San Francisco, CA.*
- Donovan, B.M. (2010). How to become a bad scientist. *Workshop offered at the annual meeting of the California Science Teacher Association, Sacramento, CA.*

### **Invited Research Talks**

1. The University of Colorado at Boulder, Center for Medieval and Early Modern Studies and the History Department (2019)
2. The University of Colorado at Boulder, Department of Molecular, Cellular and Developmental Biology (2019)
3. The Weizmann Institute, Rehovot, Israel (2019)
4. Stanford University Science Education Research Group, Stanford, CA (2019)
5. University of California Santa Cruz Department of Education, Santa Cruz, CA (2019)
6. California State Polytechnic University Department of Education, San Luis Obispo, CA (2018)
7. Harvard Medical School Department of Genetics, Boston, MA (2018)
8. Colorado College Departments of Molecular Biology, Organismal Biology and Ecology, and Psychology, Colorado Springs, CO (2018)
9. University of California, Berkeley, Graduate School of Education, Berkeley, CA (2017)

### **Invited Research Talks Continued**

10. Stanford University Science Education Research Group, Stanford, CA (2017)
11. University of Maine Center for Research in STEM Education, Orono, ME (2017)
12. University of Southern California, Los Angeles, CA (2015)
13. University of San Francisco, San Francisco, CA (2014)

### **Conference Presentations**

- Donovan, B.M. (2019) Towards A More Human(e) Genetics Education: The Impact of Human Genetics Education on Adolescent Conceptions of Race. *Paper presented at the Annual Meeting of the American Academy for the Advancement of Science, Washington DC.*
- Donovan, B.M. (2018) Towards A More Human(e) Genetics Education: Learning about Human Genetic Variation Reduces Racial Bias. *Paper presented at the 10<sup>th</sup> Annual Biology Education Research Symposium, San Diego, CA.*
- Donovan, B.M., Stuhlsatz, M., Edelson, D., Buck Bracey, Z. (2018) Gendered Genetics: Reading about the genetics of sex differences could affect gender stereotypes about intelligence. *Paper presented at the annual meeting of the National Association of Research in Science Teaching, Atlanta, GA.*
- Donovan, B.M. (2018) Learned Inequality: Racial labels in the biology curriculum can affect the development of racial prejudice. *Paper presented at the annual meeting of the National Association of Research in Science Teaching in response to the NSTA “research that matters” award, Atlanta, Georgia.*
- Donovan, B.M., Semmens, R., Keck, P., Brimhall, E., Busch, K.C. (2017). A Human(e) Genetics Education: Teaching about human genetic variation reduces racial bias amongst adolescents. *Paper presented at the annual Meeting of the National Association for Research in Science Teaching, San Antonio, Texas.*
- Edelson, D., Donovan, B.M., Stuhlsatz, M. (2017). Gendered interest: High school genetics curricula activate topical interest in biology amongst girls. *Paper presented at the annual Meeting of the National Association for Research in Science Teaching, San Antonio, Texas.*
- Donovan, B.M. (2016) Learned Inequality: Racial Labels in the Biology Curriculum Can Affect the Development of Racial Prejudice by Affecting the Perception of Human Biological Variation. *Paper presented at the annual meeting of the National Association of Biology Teachers, Denver, Colorado.*
- Osborne, J., & Donovan, B. M. (2016). Developing Elementary and Middle School Teachers’ Capabilities to Support Reading for Learning in Science. *Paper presented at the 2016 annual meeting of the National Association for Research in Science Teaching, Baltimore, Maryland.*
- Donovan, B. M. (2016). Learned Inequality: Racial labels in the biology curriculum can affect the development of racial prejudice by affecting the perception of human biological variation. *Paper presented at the 2016 annual meeting of the National Association for Research in Science Teaching, Baltimore, Maryland.*
- Donovan, B. M. (2015). The educational debt of school biology? Evidence that students’ intentions to fix the racial achievement gap are affected by subtle racial framings of monogenic diseases. *Paper presented at the 2015 annual meeting of the International Society for the History, Philosophy, and Social Studies of Biology. Montreal, Quebec.*
- Donovan, B.M. (2014). Playing with Fire? The Impact of the Hidden Curriculum in School Genetics on Essentialist Conceptions of Race. *Paper presented at the 2014 Genomics and Philosophy of Race Conference. University of California Davis, Davis, CA.*

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**Conference Presentations Continued**

Osborne, J., Roman, D., Donovan, B.M., Friend, M., Patterson, A.P. (2014). Towards a pedagogical content knowledge for literacy instruction in science. *Paper presented at the 2014 annual meeting of the National Association for Research in Science Teaching Conference, Pittsburgh, PA.*

Donovan, B.M. (2014). Playing with fire? The Impact of the Hidden Curriculum in School Genetics on Essentialist Conceptions of Race. *Paper presented at the 2014 annual meeting of the National Association for Research in Science Teaching Conference, Pittsburgh, PA.*

**Professional Service**

NARST Member (2011-present); NABT Member (2017-present); Peer reviewer, Journal of Research in Science Teaching (2014 – Present); Peer reviewer, Science Education (2014 – Present) Peer reviewer and Invited Editor, Science & Education (2016 – Present).

**Media Mentions of My Research**

American Academy for the Advancement of Science:

<https://www.eurekalert.org/aaasnewsroom/2019/webcast/?b=10>

Ed Week:

[https://blogs.edweek.org/edweek/inside-school-research/2019/03/preventing\\_racism\\_science\\_classes\\_.html](https://blogs.edweek.org/edweek/inside-school-research/2019/03/preventing_racism_science_classes_.html)

Learning and The Brain:

<https://www.learningandthebrain.com/blog/how-can-we-encourage-girls-to-pursue-stem-disciplines/>

The Independent:

<https://www.independent.co.uk/news/science/school-racism-children-textbooks-race-prejudice-education-sickle-cell-africa-a8780296.html>

The Atlantic:

<https://www.theatlantic.com/science/archive/2018/09/teaching-race-high-school-biology-textbooks/570319/>

Australian Broadcasting System:

<https://www.abc.net.au/radionational/programs/scienceshow/how-racial-prejudice-can-easily-appear-in-classrooms/10928726>

[https://abcmedia.akamaized.net/rn/podcast/2019/03/ssw\\_20190323\\_1205.mp3](https://abcmedia.akamaized.net/rn/podcast/2019/03/ssw_20190323_1205.mp3)

The Daily Mail:

<https://www.dailymail.co.uk/health/article-6710147/Scientists-say-race-does-not-determine-health-doctors-say-fueling-racial-prejudice.html?fbclid=IwAR2KQWqynUd7r3ulSC0S8IfogqNceaMfYJWK8DUEyidj7nPeVhhpwLLKXys>

### **Media Mentions of My Research Continued**

The Brown Daily Herald:

<http://www.browndailyherald.com/2014/02/24/researchers-urge-increased-environmental-science-education/>

The Boston Globe:

<https://www.bostonglobe.com/ideas/2016/11/03/law-firm-bonuses-influenced-personal-politics/39GjiHF8pXQkWLR0vzCvdJ/story.html>

### **Professional Reference**

1. **Jonathan Osborne**, Ph.D., Professor Emeritus of Science Education, Stanford Graduate School of Education, Featherbed Cottage, Featherbed Lane, Holmer Green, High Wycombe, HP15 6XQ, UK [osbornej@stanford.edu](mailto:osbornej@stanford.edu)
2. **Bryan Brown**, Ph.D., Associate Professor of Science Education & Associate Dean, Stanford Graduate School of Education, 520 Galvez – CERAS #228, Stanford, CA 94305, (650) 725-4662, [brbrown@stanford.edu](mailto:brbrown@stanford.edu)
3. **Okhee Lee**, Professor of Childhood Education, New York University, Department of Teaching and Learning, Steinhardt School of Culture, Education, and Human Development, 82 Washington Square East, New York, NY 10003, (212) 998-5882, [olee@nyu.edu](mailto:olee@nyu.edu)
4. **Noah Rosenberg**, Ph.D., Professor of Biology, Department of Biology, Stanford University 371 Serra Mall, Stanford, CA 94305, (650) 721-2599, [noahr@stanford.edu](mailto:noahr@stanford.edu)
5. **Jonathan Beckwith**, American Cancer Society Professor of Microbiology and Immunobiology, Emeritus, Harvard Medical School, Department of Microbiology and Immunobiology, HIM 1047, 77 Avenue Louis Pasteur, Boston, MA 02115, 617-432-1920, [jon\\_beckwith@hms.harvard.edu](mailto:jon_beckwith@hms.harvard.edu)
6. **Gregory Radick**, Ph.D., Professor of History and Philosophy of Science, School of Philosophy, Religion and History of Science, University of Leeds, Leeds LS2 9JT, UK, Tel: (UK) 0113 343 3269, [G.M.Radick@leeds.ac.uk](mailto:G.M.Radick@leeds.ac.uk)
7. **Ann Morning**, Associate Professor, Department of Sociology, New York University, 295 Lafayette St., Rm. 4118, New York NY 10012, (212) 992-9569, [ann.morning@nyu.edu](mailto:ann.morning@nyu.edu)
8. **Andrei Cimpian**, Associate Professor of Developmental Psychology, New York University, Department of Psychology, 6 Washington Place, room 306, New York, NY 10003, (212) 998-3551, [andrei.cimpian@nyu.edu](mailto:andrei.cimpian@nyu.edu)