

Yoav Bergner

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Research Interests

Learning Analytics, Psychometrics, Educational Makerspaces and Fablabs, Online Learning, Collaboration and Collaborative Assessment

Education

Ph.D. Theoretical Physics, Massachusetts Institute of Technology, September 2003
Nonequilibrium Quantum Field Dynamics in Real (and Imaginary) Time (Advisor: K. Rajagopal)

B.A. Physics, *magna cum laude*, Harvard University, June 1997

Current Appointment

Assistant Professor, New York University, September 2016–
Steinhardt School of Culture, Education, and Human Development

Prior Professional Experience

Research Scientist, Educational Testing Service, July 2013–July 2016
Computational Psychometrics Research Center

Adjunct Professor, New York University, March 2015–2016
Steinhardt School of Culture, Education, and Human Development

Postdoctoral Research Associate, Massachusetts Institute of Technology, July 2011–July 2013
RELATE group (Research on Learning, Assessing and Tutoring Effectively)

Assistant Professor of Physics, Bard High School Early College Queens, and Teacher, NYC Department of Education, 2008–2011

President and Founder, gammafive studios, inc., 2003–2008
Studio furniture, artwork fabrication, and architectural installations in wood, metal, and new media.

President and Founder, Little Big Mac Repair, 2003–2008

Publications

Journal Articles and Research Reports

Halpin, P. F. & **Bergner, Y.** (*accepted*). Psychometric models of small group collaboration. *Psychometrika*.

Bergner, Y. & von Davier, A. A. (*accepted*). Process Data in NAEP: Past, Present, and Future. *Journal of Educational and Behavioral Statistics*.

Bergner, Y. (2018). *CPSX: A tool for collaborative problem-solving in Open edX* (Research Memorandum No. RM-18-03). Princeton, NJ: Educational Testing Service.

Shu, Z. **Bergner, Y.**, Zhu, M., Hao, J., & von Davier, A. A. (2017). An item response theory analysis of problem-solving processes in scenario-based tasks. *Psychological Test and Assessment Modeling* 59(1), 109-131.

Bergner, Y., Andrews, J. J., Zhu, M., & Gonzales, J. E. (2016). Agent-based modeling of collaborative problem solving (Research Report No. RR-16-27). Princeton, NJ: Educational Testing Service.

Seaton, D., **Bergner, Y.**, Chuang, I., Mitros, P., and Pritchard, D. (2014), Who does what in a massive open online course. *Communications, ACM* Volume 57, April 2014, pp 58-65

Kortemeyer, G., Seaton, D., **Bergner, Y.**, Rayyan, S., and Pritchard, D. (2014). Analyzing the Impact of Course Structure on Electronic Textbook Use in Blended Introductory Physics Courses, *American Journal of Physics* Volume 82, 1186 (2014)

Bergner, Y., and Bettencourt, L.M.A. (2004). The self-consistent bounce: an improved nucleation rate, *Phys Rev D* 69 045012.

Bergner, Y., and Bettencourt, L.M.A. (2004). Dressing up the kink, *Phys Rev D* 69 045002.

Bergner, Y., and Bettencourt, L.M.A. (2003). A step beyond the bounce: bubble dynamics in quantum phase transitions, *Phys Rev D* 68 025014.

Bergner, Y., and Jackiw, R. (2001). Integrable Supersymmetric Fluid Mechanics from Superstrings, *Phys Lett A* 284 146.

Book Chapters

Bergner, Y. (2017). Measurement and its Uses in Learning Analytics. In Lang, C., Gasevic, D., Wise, A., & Siemens, G.(Eds.) *Handbook of Learning Analytics and Educational Data Mining*

Bergner, Y., Walker, E., and Ogan, A. (2017). Dynamic Bayesian Network Models for Peer Tutor Interactions, In von Davier, A., Zhu, M., & Kyllonen, P. (Eds.) *Innovative Assessments of Collaboration*, Springer.

Zhu, M. & **Bergner, Y.**, (2017). Network Models for Teams with Overlapping Membership, In von Davier, A., Zhu, M., & Kyllonen, P. (Eds.) *Innovative Assessments of Collaboration*, Springer.

Strictly Peer-reviewed Conference Proceedings

Bergner, Y. & Chen, O. (submitted) Deep Making: Curricular Modules for Transferable Content-Knowledge and Scientific Literacy in Makerspaces and FabLabs. IDC 2018.

Zhu, M., **Bergner, Y.**, Wang, Y., Baker, R., Barnes, T., and McNamara, D. S. (2016). Exponential Random Graph Models for Studying Interactions Between Engagement, Performance and Social Connectivity, *6th International Learning Analytics and Knowledge Conference (LAK 2016)*. Edinburgh, UK.

Bergner, Y., Kerr, D., and Pritchard, D. (2015) Methodological Challenges in the Analysis of MOOC Data for Exploring the Relationship between Discussion Forum Views and Learning Outcomes, *Proceedings of the 7th Annual Conference on Educational Data Mining (EDM2015)*, Madrid, Spain.

Crossley, S., McNamara, D. S., Baker, R., Wang, Y., Paquette, L., Barnes, T., and **Bergner, Y.** (2015). Language to Completion: Success in an Educational Data Mining Massive Open Online Class, *Proceedings of the 7th Annual Conference on Educational Data Mining (EDM2015)*, Madrid, Spain.

Brown, R., Lynch, C. F., Wang, Y., Eagle, M., Albert, J., Barnes, T., Baker, R., **Bergner, Y.**, & McNamara, D. (2015). Communities of performance & communities of preference. In *Proceedings of the 2nd International Workshop on Graph-Based Educational Data Mining*. Madrid, Spain.

Bergner, Y., Colvin, K., and Pritchard, D. (2015). Estimation of Ability from Homework Items When There Are Missing and/or Multiple Attempts, *Proceedings of the 5th International Learning Analytics and Knowledge Conference (LAK 2015)*. Poughkeepsie, NY.

Bergner, Y., Shu, Z., and von Davier, A. (2014), Visualization and Confirmatory Clustering of Sequence Data from a Simulation-Based Task, In *Proceedings of the 7th Annual International Conference on Educational Data Mining (EDM 2014)*. **Nominated for best paper award**

Pardos, Z., **Bergner, Y.**, Seaton, D., and Pritchard, D. (2013). Adapting Bayesian knowledge tracing to massive open online courses, In *Proceedings of the 6th Annual International Conference on Educational Data Mining (2013)* **Nominated for best paper award**

Seaton, D., **Bergner, Y.**, Kortemeyer, G., Rayyan, S., Chuang, I., and Pritchard, D. (2013), The Impact of Course Structure on eText Use in Large-Lecture Introductory-Physics Courses, *Proceedings of the 2013 Physics Education Research Conference*. Portland, OR.

Seaton, D., **Bergner, Y.**, and Pritchard, D. (2013). Exploring the relationship between course structure and etext usage in blended and open online courses, In *Proceedings of the 6th Annual International Conference on Educational Data Mining*

Bergner, Y., Rayyan, S., Seaton, and Pritchard, D. (2012). Multidimensional student skills from collaborative filtering, *Proceedings of the 2012 Physics Education Research Conference*.

Bergner, Y., Droschler, S., Rayyan, S., Seaton, D., Kortemeyer, G., and Pritchard, D. (2012). Model-based collaborative filtering analysis of student response data: machine-learning item response theory, In Yacef, K., Zaiane, O., Hershkovitz, H., Yudelson, M., and Stamper, J. (Eds.), *Proceedings of the 5th International Conference on Educational Data Mining*.

Poster Presentations

Daniels, C.*, **Bergner, Y.**, Lynch, C., and Barnes, T. (2018). Testing temporal hypotheses about online Q&A behavior: a statistical model and meta-analysis' In *Proceedings of the 8th International Learning Analytics and Knowledge Conference (LAK 2018)*. Sydney, Australia.

Bergner, Y., Walker, E. and Ogan, A. (2014). Classifying Peer Tutee Learning Gains with Hidden Markov Models. (SIGKDD 2014) New York, NY.

Open-source Code Projects

CFIRT, Collaborative Filtering Item Response Theory (<https://github.com/IEDMS/cfirt>)

CPSX, An XBlock for Collaborative Problem Solving with Open edX (<https://github.com/ybergner/cpsx>)

Fellowships and Awards

Edmund W. Gordon MacArthur/ETS Fellow for 21st Century Learning and Assessment, 2013–2016

National Science Foundation (NSF) Graduate Research Fellow, 1998–2001

John Harvard Scholar, Harvard College Scholar, 1993–1997

Grants

- (pending) IES Goal 5: Curriculum Based Assessments of Student Collaboration (co-PI, \$1,250,000)
- (pending) CIRCL Working Group (PI, \$65,000)
- NYU Moore-Sloane Data Science: Bringing Real-Time Collaboration into Online Education (PI, \$25,000)
- (Declined) NSF AISL: Collaborative Research: Makerspace Identification of Evidence for Learning (MIEL) (PI, \$180,000)
- (Declined) Beam Center/NYU FabLab Evaluation Framework Project (co-PI, \$25,000), Naomi Foundation
- Assessment of Learning in MakerSpaces (PI, \$45,000), MacArthur/ETS Edmund W. Gordon Fellowship for 21st Century Learning and Assessment
- NSF DRL Collaborative Research: Modeling Social Interaction and Performance in STEM Learning (PI, \$362,857, total award, \$774,447)
- Invited: NSF Data Intensive Research to Improve Teaching and Learning—An Ideas Lab to Foster Transformative Approaches. Selected to participate in NSF funded five-day workshop.
- Hyde and Watson Foundation (\$18,500), Digital Fabrication in the Science Lab; grant awarded for purchase of computers and rapid prototyping equipment, 2010
- (Declined) EAGER: Makerspace Identification of Evidence for Learning (PI, \$295,417), National Science Foundation
- (Declined) NSF STEM+C, EBP: The Social Journey of Zoombinis: A socio-cognitive study of CT learning (co-PI, \$599,761),
- (Declined) NSF DRL, Collaborative Assessments in Mathematics (PI, \$494,891)
- (Declined) NSF SES, Quadrature Kalman filtering for tracking change and learning in longitudinal educational assessment data (Co-PI, \$219,465)

Conference and Invited Presentations

- Progressive Assessment: Emerging Challenges in Digital Higher Education
Harvard University VPAL Research, April 2017
- A Perfect Storm for Progressive Assessment: The Educational Maker Movement
NCME, April 2017
- Building a Structurally Sound Bridge Discipline
LAK Methodology in Learning Analytics Workshop, March 2017
- Assessment of Learning in Makerspaces and FabLabs
Fablearn, October 2016
- Analytics for Collaborative Learning and Assessment: in the Wild, in the Lab, and in Between
Seminar, New York University, March 2016
- CPSX, a tool for online collaborative problem solving in Open edX
Learning with MOOCs Workshop II, October 2015

Manufacturing as a Liberal Art and the Future of Assessment of Learning in MakerSpaces and FabLabs
CRESST Conference, August 2015

Modeling the Effects of Collaboration on Mathematics Performance
National Council on Measurement in Education 2015 Annual Meeting (co-presented with P. Halpin)

Dynamic Bayesian Network Models for Peer Tutor Interactions
Teachers College Learning Analytics Seminar, September 2014

Sequence Mining a NAEP Scenario-Based Task
International Meeting of the Psychometric Society, July 2014

Dynamic Bayesian Network Models for Peer Tutor Interactions
National Council on Measurement in Education 2014 Annual Meeting

Who does what in a Massive Open Online Course (and so what?)
Seminar, Educational Testing Service, October 2013

Homework Collaboration via Discussion Boards in a Massive Open Online Course
International Meeting of the Psychometric Society, July 2013

Data-mining the comparative assistance value of interactions with a dynamical model when individual performance is observed
National Council on Measurement in Education 2013 Annual Meeting

What every science educator should know about psychometrics.
HHMI Seminar Series, MIT Biology Department, February 2013

(Ab)uses of IRT as a real time probe of ability in online learning environments
National Institute of Testing and Evaluation, Jerusalem, Israel May 2013

Collaborative filtering of student response data in online learning environments: machine-learning (multidimensional, multiple-attempt) item response theory
NYU PRIISM Center, November 2012

(Ab)uses of IRT as a real time probe of ability in online learning environments
Seminar, Educational Testing Service, September 2012

IRT in the style of collaborative filtering
77th International Meeting of the Psychometric Society, July 2012

Lessons from school: a case study in high school physics reform
AAPT Physics Education Research Conference, Omaha NE, August 2011

Bubble Dynamics in Quantum Phase Transitions
National Nuclear Physics Summer School, Santa Fe, NM, August 2002

Fluid Mechanics from Superstrings
QCD Perspectives On Hot And Dense Matter, Cargese, France, August 2001

Workshops, Tutorials, and Panels

2nd Workshop on Methodology in Learning Analytics (Workshop organizer; LAK 2018, Sydney, NSW, Australia)

EdTech MasterClass “Bottom-up Analysis and Evidence-Centered Design” (Masterclass instructor; New York University, Dec 2017)

Demystifying Learning Analytics (Panelist, New York University, November 2017)

Workshop on Methodology in Learning Analytics (Workshop organizer; LAK 2017, Vancouver, BC, Canada)

Understanding the Role of Learning Analytics in Technology-Enhanced Education (panel moderator, New York University, October 2016)

Assessment of Learning in Makerspaces and Fablabs (Fablearn 2016 Workshop, Stanford, CA)

Intermediate R Workshop (Tutorial presenter; NERA 2015)

Student Modeling, Recent Developments & Toolkits Tutorial (Tutorial presenter; EDM 2015)

Modeling Applied to Problem Solving (MAPS) Pedagogy for Physics (Workshop co-organizer, AAPT 2012)

Teaching Experience

Foundations of Cognitive Science for Learning, (Fall 2016, 2017; Spring 2017), New York University.

Topics in Advanced Quantitative Methods: Statistical Analysis of Networks, (Fall 2017), New York University.

Topics in Advanced Quantitative Methods: Educational Data Science Practicum, (Spring 2015, 2016, 2017), New York University.

Data Mining Minicourse, (Feb 2015) 3rd ICMC Workshop on Probability and Statistics, Sao Carlos, Brazil.

Philosophy of Science (Spring 2011) Bard Early College

Physics with Calculus (2010, 2011), Bard Early College

Calculus I (2009, 2010), Bard Early College

Intro to Science and High School Physics (2009, 2010, 2011), Bard High School

Private Tutor (Physics, Chemistry, Mathematics, SAT prep), Veritas Tutors, 2006-2009

Teaching Assistant, MIT, 2001-2003

8.01 Physics, 8.052 Quantum Mechanics, 8.333 Statistical Mechanics

Teaching Assistant, MIT Writing Center, 2002

Program Coordinator, TTT Foundation, 2001-2003

Designed project-based labs for an after-school program serving multicultural families with children in grades 4-7 in the greater Boston and Cambridge communities.

Professional Activities

Program Committee:

Learning Analytics and Knowledge (LAK2018)
ACM Conference on Learning at Scale (L@S2016)
International Conference on Educational Data Mining (EDM 2016, 2017)
AERA 2015 Division D (AERA 2015)
Graph-based methods in Educational Data Mining (GEDM 2015, 2017)
US Fab Lab Network, National Education Committee (2011-2012)

Reviewer:

Proceedings of the National Academy of Sciences (PNAS) (2018)
Ad hoc reviewer, IES Educational Technology (2018)
Computers & Education (2017, 2018)
Psychometrika (2014, 2017, 2018)
Journal of Learning Analytics (2016, 2017, 2018)
External reviewer, Purdue University Forecast Project (2017)
Panel reviewer, NSF DRK-12 (2017)
Journal of Educational Data Mining (2016, 2017)
Physical Review Special Topics — Physics Education Research (2015-2017)
IEEE Transactions on Learning Technologies (2016)
International Journal of Artificial Intelligence in Education (2015)
Educational Assessment (2014)

Membership:

Society of Learning Analytics Research (SoLAR; 2016-)
American Educational Research Association (AERA; 2015-2017)
National Council on Measurement in Education (NCME; 2014-2017)
International Technology and Engineering Educators Association (2017)
International Educational Data Mining Society, co-chair for Algorithm and Code Sharing (2012-2016)
International Artificial Intelligence in Education Society (2013-2014)
Psychometric Society (2013, 2014)
American Association of Physics Teachers (2012, 2013)
STEMTeachersNYC (formerly PhysicsTeachersNYC) (2010-)
New York Academy of Sciences (2008-2013)

Other Work Experience

Private Tutor, Veritas Tutors and Freelance, 2006–2009

Tutored and home schooled scores of students (middle- and high-school) in complete courses of Mathematics (Algebra II, Precalculus, Calculus, Linear Algebra), Chemistry, and Physics, including preparation for AP exams, general SAT and SAT subject tests.

Relevant Skills

Programming in R, Python, Matlab, Javascript, PHP, FORTRAN, C, and Scheme.

Fabrication technology including woodworking, metal-working, analog and digital electronics, micro-controllers (e.g. Arduino).

Fluent in Hebrew, semi-fluent in French, competent in German, studying Mandarin.

Last updated: March 21, 2018