DAVID I. MILLER

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EDUCATION

Ph.D. Student, Psychology

Northwestern University Evanston, IL 2012 – 2016

Research Advisor: David H. Uttal

Graduate Student, Science Education Research

University of California – Berkeley Berkeley, CA 2010 – 2012

■ Thesis Advisor: Marcia C. Linn

- Master's Thesis Title: "How Can Computer Visualizations Help Diverse Students Learn Science?"
- Other Thesis Committee Members: Andrea A. diSessa, Kathleen E. Metz

B.S., Mathematical Physics

Harvey Mudd College Claremont, CA 2006 – 2010

- Scholastic Distinction: B.S. with High Distinction; Dean's List (2006 2010); Honors in Physics
- Study Abroad Experience, Fall 2009 Semester: Università Cattolica del Sacro Cuore, Milano, Italia
- Thesis Title: "Can spatial training improve long-term outcomes for gifted STEM undergraduates?"
- Thesis Advisor: Diane F. Halpern

RESEARCH FELLOWSHIPS

- National Science Foundation (NSF) Graduate Research Fellowship: \$120,000 (2011–2014)
- Data Science for Social Good Fellowship at University of Chicago: \$16,000 (2014)
- University of California Berkeley Graduate Division Fellowship: \$21,347 (2010–2011)
- National Science Foundation (NSF) Research Undergraduate Experience (REU) at State University of New York Stony Brook: \$3,500 (2008)
- National Science Foundation (NSF) Research Undergraduate Experience (REU) at Lowell Observatory: \$4,775 (2007)

RESEARCH GRANTS

- American Psychological Association of Graduate Students Basic Psychological Science Research Grant: \$1,000 (2013)
- Society for the Psychological Study of Social Issues Clara Mayo Grant and Matching Funds from Northwestern University: \$1,500 (2012)
- Harvey Mudd College Research Grant for Longitudinal Extension to Thesis Project: \$575 (2010)
- Harvey Mudd College Shanahan Student-Directed Research Funds: \$5,000 (2009–2010)

RESEARCH AWARDS

- Anne Anastasi General Psychology Graduate Student Research Award awarded by Division 1 (Society of General Psychology) of the American Psychological Association (APA): \$300 (2013)
- Student Research Award awarded by the **Association for Psychological Science (APS)**: \$250 (2011)
- Anne Anastasi Student Poster Award awarded by Division 1 (Society of General Psychology) of the American Psychological Association (APA): \$100 (2010)
- Robert L. Solso Research Award awarded by the Western Psychological Foundation: \$500 (2010)

- American Psychological Association Student Travel Award: \$300 (2013)
- Northwestern University Conference Travel Grant: \$1,150 (2013)
- University of California Berkeley Conference Travel Grant: \$500 (2012)

PUBLICATIONS

- Miller, D. I., Wai, J., & Uttal, D. H. (under review). Beyond the leaky pipeline: Creating diverse paths into STEM.
- Miller, D. I. (under review). Women's progress at elite STEM Ph.D. programs: A glass ceiling?
- **Miller, D. I.,** Eagly, A. H., & Linn, M. C. (in press). Women's representation in science predicts national gender-science stereotypes: Evidence from 66 nations. *Journal of Educational Psychology*. doi: 10.1037/edu0000005
- Miller, D. I. (in press). Sex difference research: Cognitive abilities. In The Wiley-Blackwell Encyclopedia of Gender and Sexuality Studies.
- **Miller, D. I.,** & Wai, J. (2015). The bachelor's to Ph.D. STEM pipeline no longer leaks more women than men: A 30-Year analysis. *Frontiers in Psychology*, 6, 36.
- Miller, D. I., & Halpern, D. F. (2014). The new science of cognitive sex differences. *Trends in Cognitive Sciences*, 18, 37-45.
- Miller, D. I., & Halpern, D. F. (2013). Can spatial training improve long-term outcomes for gifted STEM undergraduates? *Learning and Individual Differences*, 26, 141-152.
- Uttal, D. H., **Miller, D. I.**, & Newcombe, N. S. (2013). Exploring and enhancing spatial thinking: Links to STEM achievement? *Current Directions in Psychological Science*, 22, 367-373.

PEER-REVIEWED CONFERENCE PROCEEDINGS

- Aguiar, E., Lakkaraju, H., Bhanpuri, N., **Miller, D. I.,** Yuhas, B., Addison, K., ..., Ghani, R. (2015). Who, when, why: A machine learning approach to prioritizing students at risk of not graduating high school on time. In *Proceedings of the 5th International Conference on Learning Analytics and Knowledge*. Poughkeepsie, NY: Society for Learning Analytics Research.
- Matuk, C. F., McElhaney, K. W., **Miller, D. I.,** Chen, J. K., Lim-Breitbart, J., Terashima, H., ..., Linn, M. C. (2013). Reflectively prototyping a tool for exchanging ideas. In *Proceedings of the 10th International Conference on Computer Supported Collaborative Learning* (pp. 101-104). Madison, WI: International Society of the Learning Sciences.
- McElhaney, K. W., Matuk, C. F., **Miller, D. I.**, & Linn, M. C. (2012). Using the Idea Manager to promote coherent understanding of inquiry investigations. In *Proceedings of the 11th International Conference of the Learning Sciences*. Sydney, Australia: International Society of the Learning Sciences.
- Matuk, C. F., McElhaney, K. W., Chen, J. K., **Miller, D. I.**, Lim-Breitbart, J., & Linn, M. C. (2012). The Idea Manager: A tool to scaffold students in documenting, sorting, and distinguishing ideas during science inquiry. In *Proceedings of the 11th International Conference of the Learning Sciences*. Sydney, Australia: International Society of the Learning Sciences.
- **Miller, D. I.**, & Halpern, D. F. (2011). Spatial thinking in physics: Longitudinal impacts of 3-D spatial training. In L. Carlson, C. Hoelscher, & T. Shipley (Eds.), *Proceedings of the 33rd Annual Conference of the Cognitive Science Society* (pp. 3465-3470). Austin, TX: Cognitive Science Society. [This research was turned into a full-length journal article in *Learning and Individual Differences* see publications]

- Statistical skills: Factor analysis (confirmatory and exploratory), latent class analysis, logistic and multiple regression, meta-analysis (fixed-effects and random-effects), multilevel modeling, nonparametric inference, structural equation modeling, propensity score matching
- Statistical packages used regularly: R, SPSS, Stata
- Data collection software used regularly: Amazon Mechanical Turk, Inquisit, Qualtrics
- Advanced statistical courses taken in graduate school:
 - o Latent variable modeling (instructor: William Revelle)
 - o Meta-analysis (instructor: Larry V. Hedges)
 - o Multilevel modeling (instructor: Sophia Rabe-Hesketh)
- Advanced statistical workshops attended:
 - Causal inference with quasi-experimental designs (facilitator: Joseph P. Robinson, AERA 2012 conference)
 - o Longitudinal exploratory data mining (facilitator: John J. McArdle, APS 2013 conference)
 - o Network modeling (facilitator: Lourens J. Waldorp, APS 2011 conference)

SYMPOSIUM ORGANIZED

New Research Directions on Gender Stereotypes in Science, Math, and Engineering

Association for Psychological Science

Washington, DC

May 26th, 2013

- Miller, D. I. Lead organizer and chair for symposium at the 35th Association for Psychology Science (APS) Annual Convention.
- Presenters: David I. Miller, Diane F. Halpern (discussant), Frederick L. Smyth, Greg M. Walton, Toni Schmader.

Using Visual and Spatial Thinking in Science Education

American Educational Research Association

San Francisco, CA

May 1st, 2013

- Miller, D. I., & Linn, M. C. Lead organizer for symposium at the 2013 Meeting of the American Education Research Association (AERA).
- Presenters: David H. Uttal, **David I. Miller**, Edward Pan, Kevin W. McElhaney, Marcia C. Linn (chair), Mary Hegarty, Nora S. Newcombe (discussant).

Spatial Thinking and Social Psychology: How Can They Inform Each Other?

Association for Psychological Science

Chicago, IL

May 27th, 2012

- Miller, D. I. Lead organizer and chair for symposium at the 34th Association for Psychology Science (APS) Annual Convention.
- Presenters: **David I. Miller**, Elizabeth A. Gunderson, Keith B. Maddox, Stephanie A. Gagnon, Susan C. Levine (discussant).

PSYCHOLOGY CONFERENCE PRESENTATIONS

Who, when, why: A machine learning approach to prioritizing students at risk of not graduating high school on time

Learning Analytics and Knowledge

Poughkeepsie, NY

March 18th, 2015

■ Aguiar, E., Lakkaraju, H., Bhanpuri, N., **Miller, D. I.,** Yuhas, B., Addison, K., ..., Ghani, R. Oral presentation at the 5th International Learning Analytics & Knowledge Conference.

How Communal Goals Contribute To STEM Employment

Society for Personality and Social Psychology Long Beach, CA

February 26th, 2015

■ Miller, D. I., Uttal, D. H., & Eagly, A. H. Poster presentation at the 16th Society of the Personality and Social Psychology (SPSP) Annual Meeting.

How Spatial Skills Relate To Movement Into And Out of STEM

Spatial Cognition Bremen, Germany September 18th, 2014

■ Miller, D. I., Wai, J., & Uttal, D. H. Poster presentation at the 2014 Spatial Cognition conference.

Identifying Students At Risk Accurately and Early

Knowledge Discovery and Data Mining New York City, NY August 26th, 2014

■ Aguiar, E., Lakkaraju, H., Bhanpuri, N., **Miller, D. I.,** & Yuhas, B. Oral and poster presentation at the 20th ACM SIGKDD Conference on Knowledge Discovery and Data Mining.

Replacing The Leaky Pipeline Metaphor

Inter-Science of Learning Center Conf. Pittsburgh, PA February 3rd, 2014

■ Miller, D. I., Wai, J., & Uttal, D. H. Oral presentation at the 7th Inter-Science of Learning Center Student and Post-Doc Conference.

How Have Children's Gender-Science Stereotypes Changed Over Time? A Meta-Analysis

Society for Personality and Social Psychology Austin, TX

February 14th, 2014

■ Miller, D. I., Nolla, K., Eagly, A. H., & Uttal, D. H. Poster presentation at the 15th Society of the Personality and Social Psychology (SPSP) Annual Meeting.

Women's Representation in Science Predicts National Gender-Science Stereotypes

American Psychological Association

Honolulu, HI

August 3rd, 2013

■ Miller, D. I., Eagly, A. H., & Linn, M. C. Poster presentation at the 121st American Psychological Association (APA) Annual Convention.

Reflectively Prototyping a Tool for Exchanging Ideas

Computer Supported Collaborative Learning

Madison, WI June 18th, 2013

• Matuk, C. F., McElhaney, K. W., Miller, D. I., Chen, J. K., Lim-Breitbart, J., Terashima, H., ..., Linn, M. C. Oral presentation at the 10th International Conference on Computer Supported Collaborative Learning.

Comparing Gender Stereotypes Across Cognitive Intelligences: Spatial Stereotypes Matter

Association for Psychological Science

Washington, DC

May 26th, 2013

■ Miller, D. I., Maloney, E., Beilock, S. L., & Uttal, D. H. Oral symposium presentation at the 35th Association for Psychological Science (APS) Annual Convention.

How Does Traditional Science Education Assess Visual and Spatial Thinking?

American Educational Research Association

San Francisco, CA

May 1st, 2013

■ Miller, D. I., & Linn, M. C. Oral symposium presentation at the 2013 Meeting of the American Educational Research Association (AERA).

How Do Gender Stereotypes Impact Spatial Thinking?

Inter-Science of Learning Center Conf.

Philadelphia, PA

February 22nd, 2013

■ Miller, D. I., Maloney, E., Beilock, S. L., & Uttal, D. H. Poster presentation at the 6th Inter-Science of Learning Center Student and Post-Doc Conference.

Broadening Spatial Thinking by Investigating its Role in Scientific Practices

Spatial Cognition

Bavaria, Germany

September 2nd, 2012

• Miller, D. I. Oral presentation at the 2012 Spatial Cognition conference.

Using the Idea Manager to Promote Coherent Understanding of Inquiry Investigations

Intl. Conference of the Learning Sciences

Sydney, Australia

July 5th, 2012

■ McElhaney, K. W., Matuk, C. F., **Miller, D. I.**, & Linn, M. C. Oral presentation at the 2012 International Conference of the Learning Science (ICLS).

The Idea Manager: A Tool to Scaffold Students Documenting, Sorting, and Distinguishing Ideas in Science Inquiry

Intl. Conference of the Learning Sciences

Sydney, Australia

July 4th, 2012

• Matuk, C. F., McElhaney, K. W., Chen, J. K., Miller, D. I., Lim-Breitbart, J., & Linn, M. C. Poster presentation at the 2012 International Conference of the Learning Science (ICLS).

Removing Stereotype Threat Substantially Boosts Women's Spatial Performance: A Meta-Analysis

Association for Psychological Science

Chicago, IL

May 27th, 2012

■ Miller, D. I. Oral symposium presentation at the 34th Association for Psychological Science (APS) Annual Convention.

Can a Bridging Visualization Help Chemistry Students Integrate Observable and Molecular Views?

American Educational Research Association

Vancouver, Canada

April 14th, 2012

• Miller, D. I., McElhaney, K. W., & Linn, M. C. Poster presentation at the 2012 Meeting of the American Educational Research Association (AERA).

Spatial Thinking in Physics: Longitudinal Impacts of 3-D Spatial Training

Cognitive Science Society

Boston, MA

July 23rd, 2011

■ Miller, D. I., & Halpern, D. F. Poster presentation at the 33rd Cognitive Science Society Annual Conference.

Longitudinal Impacts of 3-D Spatial Training among Gifted STEM Undergraduates

Association for Psychological Science

Washington, DC

May 28th, 2011

■ Miller, D. I., & Halpern, D. F. Oral award address and poster presentation at the 23rd Association for Psychological Science (APS) Annual Convention.

Spatial Training Improves Mathematical Physics Problem-Solving

American Psychological Association

San Diego, CA

August 13th, 2010

■ Miller, D. I., & Halpern, D. F. Poster presentation at the 118th American Psychological Association (APA) Annual Convention.

Can Spatial Skills Training Improve Students' Understanding of Introductory Physics?

American Association of Physics Teachers

Portland, OR

July 21st, 2010

■ Miller, D. I., Halpern, D. F., & Saeta, P.N. Oral presentation at the Summer Meeting of the American Association of Physics Teachers (AAPT).

Spatial Training Narrows Gender Differences in Spatial Skills

Western Psychological Association

Cancun, Mexico

April 23rd, 2010

■ Miller, D. I., & Halpern, D. F. Poster presentation at the 90th Western Psychological Association (WPA) Annual Meeting.

INVITED LABORATORY GROUP PRESENTATIONS

Gender-STEM Stereotypes: From the Sociocultural to Cognitive

University of Chicago

Chicago, IL

May 3rd, 2013

• Miller, D. I. Invited presentation at Sian Beilock's Human Performance Laboratory Group Meeting.

Spatial Thinking in STEM Education: How Do Cognitive Strategies and Stereotypes Interact?

University of Illinois at Chicago

Chicago, IL

April 9th, 2013

• Miller, D. I. Invited presentation at Mike Stieff's Research Group.

How Does Conceptual Knowledge and Psychosocial Factors Influence Spatial Thinking?

University of Chicago

Chicago, IL

September 19th, 2012

• Miller, D. I. Invited presentation at Susan Levine's Research Group Meeting.

Longitudinal Impacts of 3-D Spatial Training among Gifted STEM Undergraduates

University of California – Santa Barbara

Santa Barbara, CA

July 12th, 2011

■ Miller, D. I., & Halpern, D. F. Invited presentation at the Mary Hegarty's Spatial Thinking Laboratory meeting at University of California – Santa Barbara.

Longitudinal Impacts of 3-D Spatial Training among Gifted STEM Undergraduates

Temple University

Philadelphia, PA

May 31st, 2011

■ Miller, D. I., & Halpern, D. F. Invited presentation at Nora Newcombe's Research in Spatial Cognition (RISC) Laboratory meeting at Temple University.

PHYSICS PROFESSIONAL PRESENTATIONS

Low Temperature Pressure Gauge Based on a Quartz Tuning Fork

American Physical Society

Portland, OR

March 19th, 2010

• Huisman, F.M., Van Cleve, E., Miller, D. I., & Taborek, P. Oral presentation at the 2010 American Physical Society Annual Meeting.

Electron Counting Algorithm for Hadron Blind Detector - Hub and Spoke

Physics/Astronomy REU Student Symposium Stony Brook, NY

August 8th, 2008

■ Miller, D. I., & Hemmick, T.K. Oral presentation at the annual 2008 Physics/Astronomy REU Student Symposium.

Hub and Spoke Counting Algorithm - Simulation Results and Future Directions

Brookhaven National Laboratory

Stony Brook, NY

August 5th, 2008

■ Miller, D. I., & Hemmick, T.K. Invited oral presentation at Brookhaven National Laboratory's August 5th Hadron Blind Detector (HBD) group meeting.

The Open Cluster Berkeley 70 and its Association with Cepheid Variable Auriga 45

Astronomy REU Student Symposium

Flagstaff, AZ

August 8th, 2007

■ Miller, D. I., & Mandushev, G. Oral presentation at the annual 2007 Astronomy REU Student Symposium.

PHYSICS RESEARCH EXPERIENCE

Physics Intern – Low-Temperature Physics Laboratory

University of California - Irvine

Irvine, CA

June 2009 – August 2009

- Collaborated with a team of two graduate students and professor to implement a quartz crystal tuning fork as a sensitive pressure gauge in a vacuumed cryostat at operating temperature <2 K.
- Communicated results to laboratory group through oral presentation and written report.

Research Experience for Undergraduates (REU) - High-Energy Nuclear Physics

SUNY – Stony Brook

Stony Brook, NY

June 2008 – August 2008

- Developed an event reconstruction algorithm to be used with the installation of the novel Hadron-Blind Detector (HBD) and tested its efficacy using realistic simulated collision events.
- Presented results during an international conference call of ~25 physicists involved with the HBD's original design at Brookhaven National Laboratory's Relativistic Heavy Ion Collider (RHIC).

Physics Research Assistant - High-Energy Particle Physics

Harvey Mudd College

Claremont, CA

Sept. 2007 – March 2008

Applied different multivariate statistical classifiers to search for a faint signal of an excited charmstrange baryon using Stanford's BaBaR petabyte database of electron-positron collisions.

Research Experience for Undergraduates (REU) - Astrophysics

Lowell Observatory

Flagstaff, AZ

June 2007 – August 2007

- Designed a novel statistical field star removal algorithm to construct an open cluster's color-magnitude diagram using data acquired from the Hall 42" telescope at Anderson Mesa, AZ.
- Presented results to audience of thirty people including fellow REU interns and mentors.

TEACHING EXPERIENCE

Teaching Assistant for Research Methods

Northwestern University

Evanston, IL

March 2013 – June 2013

- Hold consultation sessions to help develop students' research projects.
- Lead class section on how to use SPSS.
- Facilitate group discussions during class.

Harvey Mudd Physics Academic Excellence (AE) Tutor

Harvey Mudd College

Claremont, CA

Sept. 2008 – May 2010

• Worked with a team of two to three other tutors guide an average of 15-20 freshmen and sophomores each session to complete weekly homework assignments while emphasizing development of problem-solving and critical-thinking skills.

Harvey Mudd Physics Tutor

Harvey Mudd College

Claremont, CA

Sept. 2007 – May 2008

■ Independently organized weekly group review-sessions to develop Harvey Mudd freshmen's understanding of special relativity and quantum mechanics through homework problems and conceptual review questions.

Community College Mathematics Tutor

South Seattle Community College (SSCC)

Seattle, WA

Sept. 2005 – Jan. 2006

• While in high school, tutored college students in both group and individual settings at SSCC's Math and Science Tutoring Center. Subjects taught ranged from beginning algebra to multivariable calculus.

STUDENT ADVISEES

Calvin Dorsey: Undergraduate Research Assistant

Northwestern University

Evanston, IL

January 2013 – Present

- Mentoring him in writing a proposal for summer research funding.
- Trained him in running participants for psychology experiments.

Silva Tang: Undergraduate Research Assistant

Northwestern University Evanston, IL October 2013 – Present

• Mentoring her on how to code articles for conducting meta-analyses.

Kylie Nolla: Undergraduate Summer Intern

Northwestern University Evanston, IL January 2013 – Present

- Mentored on her how to search literature databases, code articles, and conduct meta-analyses.
- Worked with her to prepare a poster presentation for a national conference.

Stuart Babcock: Undergraduate Research Assistant

Northwestern University Evanston, IL Oct. 2012 – June 2013

- Mentoring him in coding assessment items for their required visual-spatial thinking.
- Trained him in running participants for psychological experiments.

Jessica Kwa: CalTeach Intern

University of California - Berkeley

Berkeley, CA

June 2011 – August 2011

• Mentored her in formulating research questions and analyzing student data for her CalTeach internship which helps prepare future math and science K-12 teachers.

REVIEWING EXPERIENCE

- Ad-hoc journal reviewer:
 - o Cognitive Processing
 - o IEEE Transactions on Learning Technologies
 - o Journal of Applied Research in Memory and Cognition
 - o Journal of Educational Psychology
 - o Learning and Individual Differences
 - o Proceedings of the National Academies of Sciences
 - o Review of Psychology Frontier
- Reviewer for the Student Research Award Competition hosted by the Association for Psychological Science Student Council (2012; 2013)
- Reviewer for the RISE Award Competition hosted by the Association for Psychological Science Student Council (2012; 2013).

PROFESSIONAL ORGANIZATIONS

- American Educational Research Association (AERA)
- American Psychological Association (APA)
- Association for Psychological Science (APS)
- Cognitive Science Society
- Society for the Psychological Study of Social Issues (SPSSI)
- Society for Personality and Social Psychology (SPSP)