

# Andrew F. Heckler

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## Professional preparation

|                                |                        |                  |
|--------------------------------|------------------------|------------------|
| Ohio State University          | Physics                | B.S., 1986       |
| University of Washington       | Physics                | Ph.D., 1994      |
| Fermi National Accelerator Lab | Cosmology/Astrophysics | Post-doc 1994-96 |
| Ohio State University          | Cosmology/Astrophysics | Post-doc 1996-99 |

## Appointments

Assistant Dean, College of Mathematical and Physical Sciences, Ohio State Univ. 1998-2005.  
Assistant Professor, Department of Physics, Ohio State University. 2005-present.

## Grant Funding:

“Scientific Misconceptions: From Cognitive Underpinnings to Educational Treatment” A. Heckler, PI; V. Sloutsky, CO-PI. Funded by the Institute of Education Sciences, U.S. Department of Education. 9/1/2005-8/31/2009, \$933,397.

“Modeling instruction for Physical Science in Ohio”, A. Heckler, PI; K. Harper, Co-PI. Funded by Ohio Board of Regents Grant for Improving Teacher Quality. (2004-2006) \$114,790. Renewal: K. Harper, PI; A. Heckler, Co-Pi (2006-2009), \$363,756.

## Publications in Peer-reviewed Journals

### Education and Cognition Research

- 1) J.A. Kaminski, V.M. Sloutsky, & A.F. Heckler, “The Advantage of Learning Abstract Examples in Learning Math”. *Science*, 320, 454-455 (2008).
- 2) V.M. Sloutsky, J. Kaminski, & A.F. Heckler, “The advantage of simple symbols for learning and transfer,” *Psychonomic Bulletin & Review* 12 (3), 508-513 (2005).

### Astrophysics and Cosmology

- 1) R. Lopez, S. Dodelson, A.F. Heckler, and M.S. Turner, “Precision Detection of the Cosmic Neutrino Background”, *Physical Review Letters* 82, 3952 (1999)
- 2) A.F. Heckler “Formation of a Hawking-radiation photosphere around microscopic black holes” *Physical Review D* 55, 480 (1997)
- 3) A.F. Heckler “Calculation of the emergent spectrum and observation of primordial black holes” *Physical Review Letters*, 78, 3430 (1997)
- 4) M. Gleiser, A.F. Heckler, and E.W. Kolb, “Modeling Thermal Fluctuations: Phase Mixing and Percolation”, *Physics Letters B*, 405, 121 (1997)
- 5) M. Gleiser and A.F. Heckler, “Non-perturbative effects on nucleation”, *Physical Review Letters* 76, 180 (1996)
- 6) A.F. Heckler and E.W. Kolb, “Searching for stellar mass black holes in the solar neighborhood”, *Astrophysical Journal Letters* 472, L85 (1996).
- 7) A.F. Heckler, “The effects of electro-weak phase transition dynamics on baryogenesis and primordial nucleosynthesis”, *Physical Review D* 51, 405 (1995).
- 8) A.F. Heckler, “Astrophysical applications of quantum corrections to the equation of state of a plasma”, *Physical Review D* 49, 611 (1994).
- 9) A.F. Heckler and C.J. Hogan, “Neutrino heat conduction and inhomogeneities in the early universe”, *Physical Review D* 47, 4256 (1993).

## **Publications in Peer-Reviewed Conference Proceedings**

- 1) A.F. Heckler, J.A. Kaminski, & V.M. Sloutsky (2008). Learning Associations That Run Counter to Biases in Learning: Overcoming Overshadowing and Learned Inattention. *Proceedings of the XXX Annual Conference of the Cognitive Science Society*, 511-516. Austin, TX: Cognitive Science Society.
- 2) J.A. Kaminski, A.F. Heckler, & V.M. Sloutsky (2008). Blocking effects on dimensions: How attentional focus on values can spill over to the dimension level. *Proceedings of the XXX Annual Conference of the Cognitive Science Society*, 1075-1080. Austin, TX: Cognitive Science Society.
- 3) E.C. Sayre, & A.F. Heckler (2008). Evolution of student knowledge in a traditional introductory physics classroom. *Proceedings of 2008 Physics Education Research Conference*. Melville, New York: AIP Conference Proceedings.
- 4) R. Rosenblatt, E.C. Sayre, & A.F. Heckler (2008). Toward a comprehensive picture of student understanding of force, velocity and acceleration. *Proceedings of 2008 Physics Education Research Conference*. Melville, New York: AIP Conference Proceedings.
- 5) T. M. Scaife, & A. F. Heckler (2007). The Effect of Field Representation on Student Responses to Magnetic Field Questions. *Proceedings of 2007 Physics Education Research Conference*. Melville, New York: AIP Conference Proceedings.
- 7) J. Kaminski, V. M. Sloutsky & A. F. Heckler, (2007). The Effects of Learning Multiple Instantiations on Transfer. *Proceedings of the XXIX Annual Conference of the Cognitive Science Society*, 1581-1585. Mahwah, NJ: Erlbaum.
- 8) A.F. Heckler, J. Kaminski, & V.M. Sloutsky (2006). Differential Cue Salience, Blocking and Learned Inattention. *Proceedings of the XXVIII Annual Conference of the Cognitive Science Society*, 1167-1172. Mahwah, NJ: Erlbaum.
- 9) J. Kaminski, V.M. Sloutsky & A.F. Heckler, (2006). Effects of Concreteness on Representation: An Explanation for Differential Transfer. *Proceedings of the XXVIII Annual Conference of the Cognitive Science Society*, 1167-1172. Mahwah, NJ: Erlbaum.
- 10) J. Kaminski, V.M. Sloutsky & A.F. Heckler, (2006). Do Children Need Concrete Instantiations to Learn an Abstract Concept? *Proceedings of the XXVIII Annual Conference of the Cognitive Science Society*, 1167-1172. Mahwah, NJ: Erlbaum.
- 11) J. Kaminski, V.M. Sloutsky & A.F. Heckler, (2005). Relevant concreteness and its effects on learning and transfer. *Proceedings of the XXVII Annual Conference of the Cognitive Science Society*, 1167-1172. Mahwah, NJ: Erlbaum.
- 12) V.M. Sloutsky, J. Kaminski, and A.F. Heckler (2004) Transfer of learning between isomorphic artificial domains: Advantage for the abstract. *Proceedings of the XXVI Annual Conference of the Cognitive Science Society*, 1167-1172. Mahwah, NJ: Erlbaum.

## **Invited Presentations (Education and Cognition Research)**

- 1) "Learning biases: Overcoming scientific misconceptions", Human Factors Interest Group seminar, University of Manchester, U.K. July 19, 2008.
- 2) "Overcoming Scientific Misconceptions", Kansas State University Physics Education Research Seminar. March 4, 2008.
- 3) "Current Research Projects", University of Washington Physics Education Research Seminar. Feb 5, 2008.
- 4) "Concrete vs. Abstract: Is a little knowledge a bad thing?" Invited Session, Physics Education Research Conference, Greensboro, NC, August 2007.
- 5) "Measuring understanding: dependence of student answering on the question task." Invited Session, Summer Conference of the American Association of Physics Teachers, Greensboro, NC. August 2007.

- 6) "Concrete vs. Abstract: Is a little knowledge a bad thing?", University of Illinois Champagne-Urbana Physics Education Research Seminar. April, 2007.
- 7) "Abstract or Concrete: Which is better for learning and transfer?", American Physical Society Conference, Invited session on Physics Education Research, Jacksonville, FL. April 2007.
- 8) "Abstract or Concrete, which is better for learning or transfer?" Invited Session, Summer Conference of the American Association of Physics Teachers, Syracuse, NY. August 2006.
- 9) "Abstract or Concrete, which is better for learning or transfer?" University of Maryland Physics Education Research Seminar. April, 2006.
- 10) "Cognition and the Learning of Physics", Rutgers University Physics Education Research Seminar. May 4, 2005.
- 11) "Finding a Measure of Student Learning: the Normalized Gain and Other Measures", Ohio State University Physics Education Research Seminar. April 18, 2005.

### **Peer-Reviewed Conference Presentations**

- 1) Learning Associations That Run Counter to Biases in Learning: Overcoming Overshadowing and Learned Inattention. Paper presented at 30<sup>th</sup> Annual Conference of the Cognitive Science Society, Washington D.C., July 2008.
- 2) "How diagrams Help and Hinder Problem Solving", American Educational Research Association, 2007 National Conference, April 2007.
- 3) "The Role of Diagrams in Solving Problems", National Association of Research in Science Teaching, 2006 National Conference, San Francisco, CA, April 2006.