

## **JOHN MUMMA**

California State University of San Bernardino  
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### **AREAS OF SPECIALIZATION**

Philosophy of Mathematics, Logic, Philosophy of Logic, Philosophy of Geometry

### **AREAS OF COMPETENCE**

Early Modern European Philosophy, Philosophy of Science, Philosophy of Mind

### **ACADEMIC POSITIONS**

2012- Present: Assistant Professor, Philosophy department  
California State University of San Bernardino

2011-2012: Post-doctoral research fellow  
Max Planck Institute for the History of Science

2009-2011: Post-doctoral research fellow  
Division of Logic, Methodology, and Philosophy of Science at the  
Suppes Center for History and Philosophy of Science, Stanford  
University

2008-2009: Post-doctoral research fellow  
Ideals of Proof project (headed by Michael Detlefsen, ANR Senior  
Chaire d'excellence)

### **EDUCATION**

1998-2006: CARNEGIE MELLON UNIVERSITY  
MS in Logic and Computation  
Ph.D. in Philosophy

1991-1996: CORNELL UNIVERSITY  
BA Philosophy, August 1996.  
BS Mathematics, Cum Laude, August 1996

### **ARTICLES**

“Constructive Geometrical Reasoning and Diagrams,” forthcoming in special  
issue of *Synthese* on diagrams and mathematics. Published online on September  
7<sup>th</sup>, 2011.

“The Role of Geometric Content in Elementary Geometrical Reasoning,” *Les  
Études Philosophiques*, 2011 no. 2.

“Proofs, Pictures and Euclid,” *Synthese*, vol. 175, issue 2, 255-287, 2010.

“A Formal System for Euclid’s Elements,” *Review of Symbolic Logic* (co-authored with Jeremy Avigad and Edward Dean), vol. 2, issue 4, 700-768, 2009.  
“Ensuring Generality in Euclid’s Diagrammatic Arguments” in G. Stapelton, John Howse, and John Lee (Eds.), *Diagrammatic Representation and Inference*, Springer, 2008.

## **BOOK REVIEWS**

Review of ‘Infinity: New Research Frontiers’, *Notre Dame Philosophical Reviews*, 2011.

Review of ‘Euclid and His 20<sup>th</sup> Century Rivals: Diagrams in the Logic of Euclidean Geometry’, *Philosophia Mathematica*, 16(2), 256-264, 2008.

## **PRESENTATIONS**

“Intuitions, axioms, and formalizations of Euclid’s diagrammatic proof method,” The Hidden Face of Mathematical Axioms Colloquium, The Mathematics Department and the Institute for Philosophical Research at the National University of Mexico and the Metropolitan University of México, October 2012

“*Intuition of* and *Intuition that* with Euclidean geometric diagrams,” CSLI workshop on Logic, Action and Rationality, June 2012.

“Free-rides and overdetermined alternatives in Euclid’s diagrams” Colloquium on Mathematical Logic, Institute for Logic, Language, and Computation, University of Amsterdam.

“The Diagrammatic and the Propositional,” Summer Workshop in the Philosophy of Math, University of Pittsburgh, July 2011.

“Understanding Euclid’s diagrammatic proofs in terms of Leitgeb’s semantic/intuitive distinction,” First International Meeting of the Association for the Philosophy of Mathematical Practice, Brussels, Belgium, December, 2010.

“The role of geometric content in Euclid’s diagrammatic reasoning,” Working Group in History and Philosophy of Logic, Mathematics and Science, U.C. Berkeley, December, 2010. (invited talk)

“The role of geometric content in Euclid’s diagrammatic reasoning,” Midwest Philosophy of Math Workshop 11, Notre Dame University, October, 2010.

“Euclid’s diagrams and the primitive concepts of elementary geometry,” Formal Mathematics Seminar, Bonn Mathematical Logical Group, Bonn University, June 2010. (invited talk)

“Proof checking with geometric diagrams,” Symposium on Mathematical Cognition and Practice, DeMontfort University, Leicester, England, March 2010.

“Euclid’s diagrammatic Inferences,” Workshop on Diagrammatic Reasoning, Stanford University, March, 2010. (invited speaker)

“Exact constructions with inexact diagrams,” Notre Dame Logic Seminar, Notre Dame University, February, 2010. (invited talk)

“Exact constructions with inexact diagrams,” Symposium on Constructive Geometric Reasoning, Stanford University, October, 2009. (invited speaker)

“Relations in geometric figures versus relations in geometric spaces,” Ontological Shifts in Geometry, International Workshop, Univ. of Paris Diderot—Paris 7 June 2009. (invited speaker)

“Does rigor require that everything be laid down in advance? Diagrammatic vs. Axiomatic Proof in Elementary Geometry,” Visual Reasoning and the A Priori Workshop, Nancy-Université, May 2008. (invited speaker)

“Ensuring Generality in Formalizations of Euclid’s Diagrammatic Arguments,” Diagrams in Mathematics Workshop, Stanford University, October 2007. (invited speaker)

“Proofs, Pictures and Euclid,” Formal Epistemology Workshop, Carnegie Mellon University, May 2007.

“A Formal Analysis of Euclid’s Diagrammatic Constructions,” Association for Symbolic Logic, Winter Meeting, 2005.

“Diagrams and Deductive Gaps in Euclid’s *Elements*,” Midwest Philosophy of Math Workshop, Notre Dame, October 2005.

“Avoiding Case Explosions in Diagrammatic Proofs,” Summer Workshop in the Philosophy of Math, University of Pittsburgh, July 2005.

“Proof and Surveyability in Wittgenstein’s *Remarks on the Foundations of Mathematics*,” 20th Century Analytic Philosophy in Retrospective (graduate conference), SUNY at Buffalo, November, 2001

## **DISSERTATION**

*Intuition Formalized: Ancient and Modern Methods of Proof in Elementary Euclidean Geometry*

Committee: Dana Scott (Chair), Jeremy Avigad, Ken Manders

## **PROFESSIONAL ACTIVITIES**

2009-2011: Editor, *Synthese* special issue on diagrams in mathematics.

1999-2003 Department representative to graduate student association, Carnegie Mellon University.

## **ACADEMIC REFERENCES**

Jeremy Avigad (Carnegie Mellon University)  
Michael Detlefsen (University of Notre Dame)  
Michael Friedman (Stanford University)  
Mara Harrell (Carnegie Mellon University)  
Geoffrey Hellman (University of Minnesota)  
Ken Manders (University of Pittsburgh)  
Dana Scott (Carnegie Mellon University)

## **TEACHING**

*Instructor, Stanford University*

2010, 2011: First-order logic

An introduction to the meta-mathematics of propositional and first-order logic. Gödel's completeness and its consequences (i.e. the Lowenheim-Skolem theorem and the compactness theorem) are covered, as well as the basic concepts of intuitionistic and modal logic.

2010, 2011: Non-euclidean geometry

A course for gifted high school students on non-euclidean geometry from a modern axiomatic standpoint. The first half of the course is devoted to developing the fundamental concepts of elementary geometry abstractly and rigorously, the second half to the distinctive features of non euclidean geometry.

2010: Philosophy of Mathematics

An overview of the philosophy of mathematics as it has developed over the past two centuries. Recent work on the ontology of mathematics is covered first, and is followed by a historical survey of foundational investigations into mathematics, from Kant to Hilbert. The course ends with two isolated topics: philosophical questions surrounding the application of mathematics, and the nature of informal proof.

*Adjunct professor, Chatham University*

2007-2008: Structure and Application of Contemporary Nursing Knowledge

An online course on the complimentary roles of abstract theory and empirical research in the development of nursing knowledge. Students study the connections and interrelations between broad philosophical accounts of nursing knowledge and concrete, operationally defined concepts. Students are assessed on their participation in online discussions and their work on three research papers.

2007: Introduction to Philosophy

An introductory course focusing on some of the perennial problems of philosophy: the nature of mind and body, the nature of knowledge, freedom and determinism; the existence of God; immortality and moral responsibility.

### 2006: Introduction to Logic

An introduction to critical thinking and symbolic logic. Students developed their skills analyzing and evaluating arguments, and learned the basic formal techniques of categorical and propositional logic.

*Adjunct professor, Carnegie Mellon University*

### 2006-2008: What Philosophy Is

An introductory course divided into three sections. The first covered ethics, the second metaphysics, and the third epistemology. Discussion centered on philosophical issues addressed in primary sources. These issues included: what makes an action right or wrong (ethics), free-will, the mind-body problem, personal identity (metaphysics), the nature of knowledge (epistemology).

### 2007-2008: Logic and Mathematical Inquiry

A course covering the syntax and semantics of sentential and quantificational logic, with a final section on the axiomatic method and its place in mathematics and meta-mathematics.

### 2006: Philosophy of Mind

A course presenting the issues and positions characterizing modern philosophical investigations into the mind. Topics included: physicalism, functionalism, the problem of qualia, the problem of intentionality, and artificial intelligence.

### 2006: Nature of Mathematical Reasoning

A course introducing students to the character and power of mathematical reasoning. Various examples of mathematical reasoning and rigorous argumentation are presented, many from the history of mathematics.

*Lecturer, Carnegie Mellon University*

### 2003, 2004-2006: What Philosophy Is

For description, see entry for What Philosophy Is above.