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
"The Eu approach to formalizing the *Elements*: a response to 'On the
inconsistency of Mumma's Eu' ", to appear in the *Notre Dame Journal of
Formal Logic.*

"Universal intuitions of spatial relations in elementary geometry" (co-authored
with Ineke J.M. van der Ham and   Yacin Hamami), *Journal of Cognitive
Psychology,* published online November 17th, 2016.

"Prolegomena to cognitive investigation of Euclidean diagrammatic reasoning" (co-authored with Yacin Hamani), *Journal of Logic, Language, and Information*, vol. 22, Issue 4. pp. 421-448, 2013.

"Constructive geometrical reasoning and diagrams," *Synthese,* vol. 186, issue 1, pp. 103-119, 2012.

"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 CHAPTERS/ENCYCLOPEDIA ENTRIES

"Deduction, diagrams, and model-based reasoning" p. 523-535 in *Springer Handbook of Model-Based Science,* L. Magnani and T. Bertolotti, (Eds.), 2017.

Section 4 of "Diagrams", an entry in *Stanford Encyclopedia of Philosophy.* The section first appeared online in the fall of 2013.

BOOK REVIEWS

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

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

PRESENTATIONS

"Lewis's infinite regress, mathematical understanding, and the act of diagramming" presented at Fourth International Meeting of the Association for the Philosophy of Mathematical Practice, Salvador Brazil, October 2017.

"Lewis's infinite regress, mathematical proof, and the act of diagramming" presented at MPC seminar, Chapman University, April 2017.

"Geometric Diagrams and the Logical Form of the Parallel Postulate" presented at History and Philosophy of Mathematics seminar, The Claremont Colleges,

December 2016.

"The Regress of Carroll's Tortoise and Geometric Diagrams" presented at Logic and Philosophy of Mathematical Practices Colloquium, Vrije Universiteit Brussel, July 2016.

"Intuitions, Axioms, and Euclid's diagrammatic proof method" presented at Colloquium on Philosophy of Geometry, California State University Long Beach, May 2016.

"Mathematical rigor, modern logic, and elementary geometry" presented at special session on history and philosophy of mathematics, American Mathematical Society Fall Western Sectional Meeting, October 2015.

"Geometric figure vs. geometric space in analyzing the proofs of elementary geometry" presented at Geometry and Space in the Early Modern Age conference, Max Planck Institute for the History of Science, July 2015.

"Intuitions, axioms, and Euclid's diagrammatic proof method" presented at symposium on philosophy and geometry at Pacific APA, April 2015.

"Towards a notion of geometric consequence" presented at Midwest Philosophy of Mathematics Workshop 15, October 2014.

"Representing order information in elementary geometry: diagrams vs. axioms" presented at Seminar on History and Philosophy of Science, California Institute of Technology, November 2013.

"The indirect proof approach to parallelism" presented at PhilMath Intersem 2013, University of Lorraine-Nancy, June 2013.

"The immediacy of geometric diagrams" presented at Logic and Philosophy of Science Colloquium, University of California Irvine, May 2013.

"Parallelism and Diagrams" presented at the second SoCal PhilMath+PhilLogic +FOM workshop, University of California Irvine, February 2013.

"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

2017: Organizer with Marco Panza, Jemma Lorenat and Erich Reck of the Orange County/Inland Empire Seminar in the History and Philosophy of Mathematics.

2009-Present: Referee for *Erkenntnis, Philosophia Mathematica* and *Synthese*

2012-Present: supervisor of the *Logic Lab* at CSUSB, a place where students receive tutoring in the their logic and philosophy courses.

2015-Present: Chair of curriculum committee for College of Arts and Letters, California State University, San Bernardino.

2012-Present: Philosophy department representative for curriculum committee for College of Arts and Letters, California State University, San Bernardino.

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

ACADEMIC REFERENCES
Jeremy Avigad (Carnegie Mellon University)
Michael Detlefsen (University of Notre Dame)
Michael Friedman (Stanford University)
Ken Manders (University of Pittsburgh)
Marco Panza (IPHST/Chapman University)
Tony Roy (California State University, San Bernardino)
Dana Scott (Carnegie Mellon University)

TEACHING

Assistant Professor, California State University San Bernardino

2012 -2017: Critical Thinking Through Symbolic Logic
An introduction to propositional logic and the analysis it provides of logical validity. Topics covered: truth tables, translation of natural language sentences into propositional logic and natural deduction.

2013 -2017: Predicate Logic
An introduction to predicate logic and the analysis it provides of logical validity. Topics covered: basic model theory, translation of natural language sentences into predicate logic and natural deduction.

2013 -2017: Advanced Issues in Logic
A course devoted to one of three possible topics: the completeness theorem for first-order logic, Gödel's incompleteness theorems, or set theory.

2016: Introduction to Philosophical Issues
An introductory philosophy course surveying classic problems in philosophy—e.g. free-will, personal identity, the nature of right and wrong.

2015: Philosophy of Science

An introductory course in the philosophy of science, surveying major developments in the field from the first half of the twentieth century onward. Authors discussed include Carnap, Kuhn, van Franssen and Boyd.

2014, 2016: Philosophy of Logic
A course examining the notion of logical consequence. The first half of the course is devoted to the standard Tarskian definition of the notion and Etchemendy's critique of it. The second half of the course is devoted to the relation of logical consequence to reasoning. Authors discussed include Prior, Prawitz and Harmon.

2013: 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.

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 inutitionistic 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 Contempory 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/lecturer Carnegie Mellon University

2003-2008: 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.