Joint CSHPM, HOMSIGMAA, POMSIGMAA Sessions at MathFest 2013

Thursday, August 1, 2013

History and Philosophy of Mathematics Contributed Paper Session

	Subsession Title: Euler's Mathematics (Room 27)
9:00	Robert E. Bradley, Leonhard Euler's Mathematical Correspondence - The Early Berlin Years
9:30	Stacey Langton, Vector Calculus in Euler's Fluid Mechanics
10:00	Michael P. Saclolo, Euler's Method for a Plentiful Harvest
10:30	Hedrick Lecture #1
11:30	Lunch (CSHPM Council Meeting)
	Subsession Title: Seventeenth Century (Room 27)
1:00	Christopher Baltus, Conics in the 17th Century: Claude Mydorge and After
1:30	John F. Bukowski, Christiaan Huygens's Work on the Catenary, 1690-1691
2:00	Maria Zack, The Geometric Algebra of John Wallis
~~2:30~~	~~Troy Larry Goodsell, Newton's Writings on the Calculus~~ CANCELLED
	Subsession Title: Eighteenth Century (Room 27)
3:00	David R. Bellhouse, Après 1713: Bernoulli, Montmort et Waldegrave
3:30	Theodore J. Crackel, Frederick Rickey and Joel Siverberg, George Washington's Use of Trigonometry and Logarithms
4:00	Scott Guthery, Mathematics as Practiced in Colonial and Post-Colonial America
4:30	Florence Fasanelli, Images of Andrew Ellicott (1754-1820)
5:00	Duncan Melville, How Brook Taylor got Joshua Kirby a Job.

Friday, August 2, 2013

Time		
	Subsession Title: Twentieth Century (Room 27)	Subsession Title: Nineteenth Century (Room 26)
8:30	~~David Orenstein, Statistics at the 1924 Toronto IMC and BAAS~~ CANCELLED	Ezra Brown, Origins of Block Designs, Normed Algebras, and Finite Geometries
9:00	Matt Clemens, Fictionalism and Mathematical Practice	Salvatore Petrilli, Monsieur François-Joseph Servois: His Life and Mathematical Contributions
9:30	~~Janet Beery, Who's That Mathematician? No, Really, Who is She (or He)?~~ CANCELLED	Shigeru Masuda, The Definite Integral by Euler, Lagrange and Laplace from the Viewpoint of Poisson
10:00	Robert Moir, Rational Discovery of the Natural World: An Algebraic and Geometric Answer to Steiner	
10:30	Jonathan P. Seldin, Mathematical Logic and the History of Computers	
11:00	Jean-Pierre Marquis, Canonical Maps: Where Do They Come From and Why Do They Matter?	
11:30	MathFest Prize Session (Ballroom B)	
12:00	Lunch	
1:00	CSHPM AGM (Room 27)	
2:30		Glen Van Brummelen, Tools of the Table Crackers: Quantitative Methods in the History of Numerical Tables
	Subsession Title: Using History and Philosophy in Teaching Mathematics (Room 27)	Subsession Title: Twentieth Century (Room 26)
3:00	Martin Flashman, Logic is Not Epistemology: Should Philosophy Play a Larger Role in Learning about Proofs?	Roger Godard, On the Chebychev Quadratures
3:30	Xinlong Weng, Teaching Mathematical Ideas by the History of Quadratic to Quartic Equations	Charlotte Simmons, Felix Hausdorff: We Wish For You Better Times
4:00	Lyn Miller, Playful History: A Generalizable Mesolabium for Geometer's Sketchpad	
4:30	Diana White, Historical Accuracy, Popular Books, and Videos: Three Components of a History of Math Class	
5:00	Santhosh Mathew, The Use of History of Mathematics as a Tool in Teaching Mathematics	

Saturday, August 3, 2013

Session Title: The Arc of Time (Room 27)

8:30	Charlie Smith, Euclid's Treatment of the Golden Ratio
9:00	Eugene Bowman, How We Got From There to Here: A Story of Real Analysis (replaced Landry's cancelled talk)
9:30	George P.H. Styan, Some Illustrated Comments on Selected "Magical Squares with Magical Parts"
~~10:00~~	~~Amy Shell-Gellash and Amy Ackerberg-Hastings, Mathematical Devices at the Smithsonian: Ideas for using digital collections in the classroom~~ CANCELLED

Interactions Between History and Philosophy of Mathematics Contributed Paper Session (Room 27)

10:30	Thomas Drucker, Zeno Will Rise Again
11:00	Amy Ackerberg-Hastings, Analysis and Synthesis in Geometry Textbooks: Who Cares?
11:30	Lunch
1:00	Jeremy Gray Talk (Ballroom B)
2:30	Robert Thomas, Assimilation in Mathematics and Beyond
3:00	Larry D'Antonio, Euler and the Enlightenment
3:30	Maryam Vulis, Persecution of Nikolai Luzin
4:00	Roger Petry, Philosophy Etched in Stone: The Geometry of Jerusalem's 'Absalom Pillar'
4:30	Jeff Buechner, Understanding the Interplay between the History and the Mathematics in Proof Mining

CSHPM/SCHPM Annual Meeting 2013
Abstracts of Presented Papers

Amy Ackerberg-Hastings (NMAH/UMUC)
Analysis and Synthesis in Geometry Textbooks: Who Cares?

Thirteen years ago, I completed a history of technology and science degree by writing a dissertation on how early 19th-century college teaching in the United States was shaped in part by two ubiquitous terms, analysis and synthesis, and three distinct but interrelated definitions for the terms: as mathematical styles, as directions of proof, and as educational approaches. To the best of my knowledge, however, the hardy few who read the dissertation were more interested in my biographies of Jeremiah Day, John Farrar, and Charles Davies than in the claims I made about the interactions between mathematics, philosophy, and pedagogy in these men's cultural context.

Now, I am rewriting the dissertation, rearticulating these intellectual connections, and, ultimately, reaffirming their historical significance. This talk will report on this process of rethinking in order to highlight the importance of philosophy in intellectual and cultural approaches to history. I will also discuss how an awareness of this interplay between philosophy and history can positively influence how we present mathematics to students.

Christopher Baltus (SUNY Oswego)
Conics in the 17th Century: Claude Mydorge and After

Claude Mydorge (1585 - 1647), friend and collaborator of Descartes, published *Prodromi catoptricorum et dioptricorum: sive conicorum operis . . .* , in two books, in 1631, with two more books to follow in 1639. His was the first in a burst of interest in the conic sections; later authors included Desargues, St. Vincent, de Witt, Wallis, and de la Hire. The subject was still just footnotes to the Conics of Apollonius in the 1620's; Mydorge wanted to introduce and simplify the study for his readers. With Mydorge, as with work that followed, we see: adherence to the structure of Apollonius, interest in mechanical production of the conics, and preference for synthetic methods in an era of enthusiasm for the analytic. Mydorge's influence seems small, although Oughtred's unpublished reworking and translation was the basis for an addition to Jonas Moore's Arithmetic, 1688.

David Richard Bellhouse (University of Western Ontario)
Après 1713: Bernoulli, Montmort et Waldegrave

The fifth section of the second edition of Pierre Rémond de Montmort's *Essay d'analyse sur les jeux de hazard* published in 1713 contains correspondence on probability problems between Montmort and Nicolaus Bernoulli. This correspondence begins in 1710. The last published letter, dated November 15, 1713, is from Montmort to Nicolaus Bernoulli. There is some discussion of the strategy of play in the card game Le Her and a bit of news that Montmort's friend Waldegrave in Paris was going to take care of the printing of the book. From earlier correspondence between Bernoulli and Montmort, it is apparent that Waldegrave had also analyzed Le Her and had come up with a randomized strategy as a solution. He had also suggested working on the problem of the pool, or what is often called Waldegrave's problem. The Universitätsbibliothek Basel contains an additional forty-two letters between Bernoulli and Montmort written after 1713, as well as two letters between Bernoulli and Waldegrave. The letters are all in French. The trio continued to discuss probability problems, particularly Le Her which was still under discussion when the *Essay d'analyse* went to print. We describe the probability content of this body of correspondence and put it in its historical context. We also provide a proper identification of Waldegrave based on manuscripts in the Archives nationales de France in Paris.

Robert E. Bradley (Adelphi University)
Leonhard Euler's Mathematical Correspondence— The Early Berlin Years

Leonhard Euler spent the early years of his professional career at the St. Petersburg Academy. His reputation as a mathematician increased throughout this period and eventually earned him a senior appointment to the Berlin Academy in 1741. During his early Berlin years, he engaged a number of colleagues in fruitful mathematical correspondence. We examine this period of expansion of his scientific community, paying particular attention to his correspondence with Nicholas (I) Bernoulli and Gabriel Cramer.

Ezra A Brown (Virginia Tech)
Origins of Block Designs, Normed Algebras, and Finite Geometries: 1835 to 1892

In this talk, we give a brief tour of the birth and early development of finite geometries, combinatorial designs, and normed algebras. Arthur Cayley (1845), Jakob Steiner (1853) and Gino Fano (1892) are credited with the creation of (respectively) the 8-dimensional real normed algebra, certain block designs with block size 3, and the first finite geometry. During our tour, we learn about the truly ground-breaking work of Julius Plücker, John Graves, Wesley Woolhouse and Thomas Kirkman, work that anticipated Cayley, Steiner and Fano by one, 18, and 57 years, respectively. Even better—from the speaker's point of view—the tour begins with elliptic curves and ends with the (7,3,1) block design.

Jeff Buechner (Rutgers University and Saul Kripke Center, CUNY GC)

Understanding the Interplay between the History and the Philosophy of Mathematics in Proof Mining

What is the nature of the relationship between the history of mathematics and the philosophy of mathematics? We conjecture one particular aspect of this relationship (which we take to be a necessary condition) contextualized to the field of proof mining: understanding issues in the philosophy of mathematics is needed to properly understand episodes and developments in the history of mathematics, and episodes and developments in the history of mathematics are needed to properly understand issues in the philosophy of mathematics.

Hilbert's program which is a precursor of proof mining cannot be properly understood without understanding the philosophical problem of theoretical terms, their explanatory role in mathematics, their role in questions of mathematical realism, the crisis in the foundations of mathematics, the change from classical to modern mathematics, and the nature of mathematical understanding. Some philosophers misunderstand Hilbert's epistemology because they neglect the history of mathematics and some historians misunderstand Hilbert's program because they neglect the philosophy of mathematics.

We illustrate the symmetrical relation between the philosophy of mathematics and the history of mathematics in Hilbert's original formulation of his program, how Gödel's second incompleteness theorem eliminated certain aspects of Hilbert's program and motivated the revision of other aspects, Kreisel's re-interpretation of the program in terms of proof transformations needed to extract information from proofs such as effective bounds and algorithms for computing witnesses to ineffectively specified existential formulas, Kreisel's no-counterexample interpretation, Kriesel's notion of unwinding proofs, Gödel's Dialectica (functional) interpretation, and some of Kohlenbach's recent work in proof mining.

John Bukowski (Juniata College)

Christiaan Huygens's Work on the Catenary, 1690-1691

In 1646 the young Christiaan Huygens proved that the shape of the hanging chain, or catenary, was not a parabola. Forty-four years later, no one had yet described the actual shape of the catenary, so Jakob Bernoulli posed the problem publicly in *Acta Eruditorum* in 1690. Huygens then studied several aspects of the curve, such as arclength, radius of curvature, and the evolute. He published these characteristics of the catenary in a short article one year later in the *Acta*, along with articles by Leibniz and Johann Bernoulli. We will examine some of the background work in Huygens's Notebook G that led to his published results.

Matthew Clemens (Keene State College)

Fictionalism and Mathematical Practice

In a prominent critique of mathematical fictionalism, John Burgess has argued that there is no version of the view that can preserve the desideratum that a philosophy of mathematics be philosophically modest, i.e., non-revisionary with respect to mathematical practice. Several advocates of mathematical fictionalism have recently offered defenses of their views against this critique from Burgess. In this paper, I consider a number of such defenses of fictionalism, and argue that none are compelling solutions for the philosopher of mathematics who aims to respect mathematical practice. By contrast, I suggest that given a significant broadening of the definition of mathematical fictionalism, a fictionalist view might be articulated which is genuinely non-revisionary with respect to mathematical practice. Such a view retains the fictionalist analogy between the mathematical and the fictional, but maintains that the entities of such realms exist as abstract artifacts; call this 'artifactual fictionalism'. As this new view departs radically from traditional fictionalism, I offer some remarks relating artifactual fictionalism to traditional versions of mathematical fictionalism.

Theodore J. Crackel (Papers of George Washington), V. Frederick Rickey (West Point), Joel Silverberg (Roger Williams University)

George Washington's Use of Trigonometry and Logarithms

You will probably remember from your grade school education that George Washington spent several of his youthful years as a professional surveyor. But how much mathematics did he know and how did he use it as a surveyor? Thanks to two "cyphering books" he compiled as a teenager, we are able to show what he learned of trigonometry and surveying. His combined use of these subjects is very perplexing to the modern reader, so we shall illustrate and explain the methods he used. Finally, in contrast to what one would expect, we will argue that he did not use trigonometry in surveying.

Lawrence D'Antonio (Ramapo College)
Euler and the Enlightenment

The Swiss mathematician and scientist Leonhard Euler is also a key figure in the philosophical discourse of the Enlightenment. In this talk we will take a detailed look at Euler's contributions to the metaphysics of his era. For example, the theory of causality found itself under attack from the skepticism of Hume and also from philosophers who tried to reconcile Newtonian physics with role of God in the universe. The primary theories of causality in the early 18th century were that of pre-established harmony as put forth by Leibniz and Wolff and the theory of occasionalism as supported by the Cartesians. Against these theories, Euler in his *Letters to a German Princess*, argued for the interaction of substances known as the theory of physical influx. Euler's theories of causality, the nature of forces, the divisibility of space, and the general nature of space and time, are important influences on the work of Immanuel Kant.

Thomas Drucker (University of Wisconsin, Whitewater)
Zeno Will Rise Again

The adage that history is written by the victors has been as true in mathematics as elsewhere. When one looks at texts in the history of mathematics, there is more attention paid to the developments of the past that can be construed as leading to what mathematicians do today than to avenues that have proved to be dead ends. It is not surprising that mathematicians are interested in the roots of what they do, and the Whig interpretation of history cuts across many disciplines.

Texts in the philosophy of mathematics are more catholic in their accounts of the past. This may be the result of the sense that no philosophical position, however unfashionable, is incapable of resuscitation by later hands and arguments.

Mathematicians are willing to relegate pieces of the past to a footnote, while philosophers do not readily inter those pieces. When one looks at the history of the philosophy of mathematics, it looks more like a spiral than a chronicle of progress. This talk will look at particular examples of the revival of philosophical positions and the difference in attitude toward the past between historians and philosophers.

Florence Fasanelli (AAAS)
Images of Andrew Ellicott (1754–1820)

Andrew Ellicott defined our country with federal commissions to survey its borders, west, south and north, and lay the boundaries of the Federal District in the late 17th and early 18th centuries. This talk will share information about his images as they fit into the history of his noteworthy life as an astronomer and mathematics educator who provided generations of surveyors with the skills to mark out the land.

Martin Flashman (Humboldt State University)
Logic is Not Epistemology: Should Philosophy Play a Larger Role in Learning about Proofs?

Many transition to proof courses start with a review or introduction to what is often described as "logic". The author suggests that students might be better served with an alternative approach that connects notions of proof with philosophical discussions related to ontology and epistemology. Examples will be offered to illustrate some possible changes in focus.

Roger Godard (RMC)
On the Chebychev Quadratures

In 1873, Charles Hermite studied a numerical solution to the integral $\int_{-1}^{+1}\frac{f(x)}{\sqrt{1-x^2}}dx$. Then in 1874, following him, Chebychev published in Liouville's journal an important article on quadratures. Chebychev assumed that, given a function $F(x)$, he searched to approximate integrals of the type $\int_{-1}^{+1}F(x)\phi(x)dx$ for any function $\phi(x)$ by the formula $k[\phi(x_1)+\phi(x_2)+\cdots+\phi(x_n)]$ where $x_1, x_2, \dots, x_n$ are the Chebychev nodes. This formula differed from the Gaussian quadrature by the fact that all values of $\phi(x)$have the same weight *k*.

In this present work, we analyze Chebychev's article and we follow the progress of numerical quadratures in France, Germany and Russia from 1874 to 1936. Finally, we comment the following diagram which represents the frequency of numbers of published articles about all methods of numerical integration from 1816 to 1960.

Troy Larry Goodsell (Brigham Young University, Idaho)
Newton's Writings on the Calculus

In this talk we will look at the history of Sir Isaac Newton's publications on the calculus. We will consider the audience and context of the different publications and discuss how these affected the content, organization, and style of his writings.

Jeremy Gray (Open University)

Kenneth O. May Lecture – Henri Poincaré: Mathematician, Physicist, Philosopher

Henri Poincaré held strong views about human knowledge that animated his work in both mathematics and physics. He held views on the possibly non-Euclidean nature of space, on the foundations of mathematics, on the fundamental 'laws' of physics, on why the basic equations of mathematical physics are linear, on space and time, and on theory change in science. These views, and the debates they generated, give a rich insight into the frontiers of research a century ago.

Scott Guthery (Docent Press)

Mathematics as Practiced in Colonial and Post-Colonial America

In their 1934 Carus monograph, *A History of Mathematics in America Before 1900*, David Smith and Jekuthiel Ginsburg confined their attention to the mathematics as found in scholarly texts. As a compliment to their work, this presentation considers mathematics as it was put to work in the field, on the street and at sea in colonial and post-colonial America. Books, tracts, periodicals and patents readily accessed in public libraries that describe in do-it-yourself terms how harness mathematics in various practical contexts form the primary source material for the study. In contrast to Smith and Ginsburg who found very little scholarly mathematics of note immediately after the revolution, we find mathematics of considerable maturity, creativity and insight being used in building the new nation. The presentation includes illustrative vignettes from the engineering of water works and the construction of flour mills.

Stacy Langton (University of San Diego)

Vector Calculus in Euler's Fluid Mechanics

The basic differential operators of "vector calculus" are the gradient, divergence, and curl. Like other vector operations, such as dot products and cross products, they developed out of Hamilton's work on quaternions. (The "∇" symbol was introduced by Hamilton in 1846.)

Nevertheless, all three vector calculus operations occur in Euler's first major paper on fluid mechanics, the "Principia motus fluidorum" (E258) of 1752. This paper is divided into two parts. The first part, in which Euler shows that, for an incompressible fluid, the velocity field must have divergence ~ 0, has been discussed by Ed Sandifer in his "How Euler did it" column for September 2008. This talk will focus mostly on the second part, in which Euler writes down the general equations for fluid motion—which involve the gradient of the internal pressure—and in particular will discuss what Euler does with the curl. Some of the ideas here had occurred previously in the work of d'Alembert.

Jean-Pierre Marquis (Université de Montréal)

Canonical maps: where do they come from and why do they matter?

The term "canonical" is now common in mathematics and the term "canonical map" finds its way in various mathematical contexts. However, there is no definition of what a canonical map is in general. In this talk, I want to sketch some of the roots of the terminology and explore why canonical maps are important mathematically and philosophically. I will focus on its progression in the literature and how this progression is intimately linked to the growth of category *theory*.

Shigeru Masuda (Kyoto Univ)

The Definite Integral by Euler, Lagrange and Laplace from the Viewpoint of Poisson

Since 1806, Poisson issued many papers on the integral of mixed equations of difference and differential, transcendental functions, and remarked on the necessity of careful handling to the transition from real to imaginary numbers. Poisson owes his knowledge to Euler, Lagrange and Laplace, and builds up his principle of integral, consulting Lacroix, Legendre, and others. Poisson is not in agreement with Euler's or Laplace's diversion from real to imaginary. Of interest is Euler's paper on the origin of the gamma function or the Euler's second law of integral written in 1781 (this paper is not edited now in the Leonhardi Euleri Opera Omnia.) Euler's method for discovering the integral formula is due to the passage of real to the transcendental function of the problem of seeking a convergence point of a spiral. The papers by Laplace, which show the origins of the Laplace transform, are on the integral method using the passage from real to imaginary, and its application to the problem of Euler's spiral. Poisson wrote a series of papers (1806–1823) which criticize the methods used by Euler and Laplace.

Santhosh Mathew (Regis College)

The Use of History of Mathematics as a Tool in Teaching Mathematics

Mathematics, in general, has the dubious distinction of being abstract and it often instills a widespread sense of concern for many students. Mathematics education, the foundation of all sciences, has lately become a political issue with some experts arguing for revolutionary changes in the curriculum by suggesting the replacement of traditional algebra with the elements of quantitative reasoning. Although the assimilation of technology has played a significant part in the continuing effort to improve the teaching of mathematics many challenges still remain and these need to be addressed. This paper investigates the possible role of the history of mathematics in undergraduate mathematics courses. Specifically, the paper explores how the history of mathematics can be integrated in the classrooms through well designed lesson plans that can relate to the learning community at large. The goal is to generate a positive attitude towards mathematics by encompassing historical aspects of the subject and to use such components to inspire students. This ongoing research focuses on identifying the segments from both ancient and modern history of mathematics that are suitable to incorporate in current programs in order to achieve the recommended outcomes. The paper also presents a case study that demonstrates the feasibility and a possible framework towards the implementation of history of mathematics as an active tool of learning and teaching. The research will continue to analyze the opportunities and limitations of this approach in the context of teaching mathematics.

Duncan J Melville (St. Lawrence University)

How Brook Taylor Got Joshua Kirby a Position

In 1748, Joshua Kirby was a provincial coach-painter in Ipswich, Suffolk. By 1755 he was tutor in perspective to the Prince of Wales (the future George III). In between, he published Dr. Brook Taylor's *Method of Perspective Made Easy*, a book that aimed to explain Brook Taylor's notoriously difficult *Linear Perspective*. Using the subscription lists of the three works he published during this period, we trace how Kirby's expanding social networks brought him to the notice of those in power.

J. Lyn Miller (Slippery Rock University)

Playful History: A Generalizable Mesolabium for Geometer's Sketchpad

In the history of attempts to duplicate the cube, the mechanical device called a mesolabium plays a role. During a recent sabbatical to study history of mathematics, the presenter engaged in a little mathematical recreation by constructing a generalizable mesolabium using the commonly accessible software package Geometer's Sketchpad. This talk will review the background of this historical device, then demonstrate some variations of the object as simulated in Sketchpad. The process lends itself well to student projects combining history of mathematics with educational technology.

Robert Moir (Western University)

Rational Discovery of the Natural World: An Algebraic and Geometric Answer to Steiner

Steiner (1998) argues that the mathematical methods used to discover successful quantum theories are anthropocentric because they are "Pythagorean", i.e., rely essentially on structural analogies, or "formalist", i.e., rely entirely on syntactic analogies, and thus are inconsistent with naturalism. His argument, however, ignores the empirical content encoded in the algebraic form and geometric interpretation of physical theories. By arguing that quantum phenomena are forms of behavior, not things, I argue that developing a theory capable of describing them requires an interpretive framework broad enough to include geometric structures capable of representing the forms, which set theory provides, and strategies of algebraic manipulation that can locate the required structures. The methods that Steiner finds so suspect or mysterious are entirely reasonable given two facts: (1) discovering new theories requires algebraic and structural variation of old theories in order to access new forms of behavior; and (2) recovering the (algebraic and geometric) form of the prior theories is necessary to retain their empirical support. Accordingly, I argue that the methods used to discover quantum theory are both rational and consistent with naturalism.

Salvatore John Petrilli (Adelphi University)

Monsieur François-Joseph Servois: His Life and Mathematical Contributions

Who was the mathematician François-Joseph Servois (1767–1847)? To the extent that his name is known at all, it is for introducing the words "distributive" and "commutative" to mathematics. Servois was ordained a priest near the beginning of the French Revolution. Had it not been for the revolution, it seems likely he would have remained a priest and become a successful mathematician. With the outbreak of the revolutionary wars, he joined the armed forces and followed a military career while also pursuing mathematics during his leisure time. His mathematical career flourished once he was appointed professor of mathematics at the French artillery schools. This talk will present a survey of the life and subtle mathematical contributions of Servois.

Roger Auguste Petry (Luther College at the University of Regina)

Philosophy Etched in Stone: The Geometry of Jerusalem's 'Absalom Pillar'

Built in the first century CE, the "Absalom Pillar" is an impressive 20 meter monument in Jerusalem's Kidron Valley noted for its unusual archaeological and geometric features. Over many years scholars have debated the meaning and function of the pillar, especially what portions serve as a sepulchral monument and what (if any) as a tomb. This paper makes use of a practical philosophical approach employed mathematically to identify external geometric features of the pillar and from these features derive principles that seem to inform its construction. In doing so, the paper draws upon (and constrains itself) to geometric knowledge available to builders in the first century CE. A complex geometry seems to underlie the monument's construction with seeming allusions to Archimedes' works "Measurement of a Circle" and "On the Sphere and the Cylinder". Possible philosophical interpretations of these geometric findings are also explored through the writings of the Jewish philosopher, Philo of Alexandria (20 BCE – 50 CE). The Pillar's geometry is shown to be readily intelligible through Philo's symbolic interpretations of mathematics including numeric symbolism he draws from Hebrew Scriptures. The paper concludes that the upper portion of the Pillar is likely a tomb marker and the lower portion a tomb on the basis of a possible geometric allusion to Archimedes' famous tomb marker in Syracuse.

Michael P. Saclolo (St. Edward's University)

Euler's Method for a Plentiful Harvest

Euler's deep scientific curiosity is reflected by the wide variety of topics he studied. In a document delivered to the Free Economic Society of Russia, he takes on agriculture and economics as he reports on a farming method for grain that he claims to increase the crop yield tenfold. In this talk we shall look at the steps Euler outlines from sowing to harvest as well as his estimates of the potential yield. We shall also try to situate the original document, first published in Russian with a German version appearing a few years later, within the context of Euler's life.

Jonathan Seldin (University of Lethbridge)

Mathematical Logic and the History of Computers

Many mathematicians and computer scientists are aware that mathematical logicians played a significant role in the original development of electronic computers, but as time has passed some of the details of this role seem to be on the verge of being forgotten. Since I was a student of H. B. Curry, who was one of the logicians involved, I know some aspects of this role which have not, to my knowledge, been published, especially some of Curry's personal recollections. In this talk, I intend to discuss my knowledge of this role, including the personal recollections, in the hope that awareness of this important role of mathematical logicians will be revived. The talk will include: 1) a discussion of the role λ-calculus and combinatory logic played in the development of recursive function theory and the development of programming languages, and 2) a discussion of the early work of Curry and von Neumann on the ENIAC and Curry's theory of programming which arose from that.

Charlotte Simmons (University of Central Oklahoma)

Felix Hausdorff: We Wish for You Better Times

According to a German television broadcast on April 30, 1967, entitled *Die Wissenschaftler im Exil* (Scientists in Exile), the percentage loss of scholars suffered by the German universities in 1933 was greatest for mathematicians. As many as 144 German-speaking mathematicians can be listed who had to leave their positions and homes after 1933. As Michael Goolomb put it, "Most of them emigrated, but some of them lost their lives." Felix Hausdorff, credited as one of the founders of topology, is amongst these. In this talk, we will explore the life of this great mathematician, astronomer, and litterateur, who wished for his friends that they would "experience better times."

Charlie Smith (Park University)

Euclid's Treatment of the Golden Ratio

"The division of a finite straight line in extreme and mean ratio" originated in the Pythagorean School, and not surprisingly appears several times in The Elements. This talk will discuss some of Euclid's significant propositions which feature the golden ratio and the golden triangle.

Examples will include Book 2, Prop 11, the area formulation of the golden ratio; Book 4, Prop 10, the construction of the golden triangle; Book 4, Prop 11, the construction of a regular pentagon in a given circle; Book 6, Def 3, the proportion definition of the golden ratio; Book 6, Prop 30, the division of a line segment in the golden ratio; and Book 13, Prop 8, the diagonals of a regular pentagon divide each other in the golden ratio.

George P.H. Styan (McGill University)

Some illustrated comments on selected "magical squares with magical parts"

Following the classic book "Mathematische Mussestunden" by the mathematician Hermann Schubert (1848–1911), first published in 1898, we say that the 8x8 classic magic matrix A defines a "magical square with magical parts" whenever the four corner 4x4 submatrices are all fully-magic each with the same magic sum.

In the 1845 booklet “A New Method of Ascertaining Interest and Discount”, Deacon Israel Newton (1763–1856) noted that such a magic square satisfies what we call the “Newton-shuffle”: the subsquares “may be cut apart, shuffled up together and placed together in a square form as it may happen, and it will form a [magic] square retaining all [the same properties that A has]”. The earliest such “magical square with magical parts” seems to be by Thakkura Pheru (fl. 12911323), who wrote encyclopedic books on coins and gems in Delhi. We have found examples published much more recently by the polymath Benjamin Franklin (1706–1790), the French physician and botanist JacquesBarbeu-Dubourg (1709–1779), the American conchologist and malacologist Lorraine Screven Frierson (1861–1938), and by the Belgian mathematician Maurice Kraïtchik (1882–1957). We illustrate our findings with Anderson graphs (Bragdon’s “magic lines” diagrams, Moran’s “sequence designs”) and whenever feasible with images of postage stamps or other philatelic items. With this talk we are pleased to celebrate the International Year of Statistics 2013 and the special year for Mathematics of Planet Earth 2013. [Joint research with Ka Lok Chu (Montreal) and Reijo Sund (Helsinki).]

Robert Thomas (University of Manitoba)

Assimilation in Mathematics and Beyond

‘Assimilation’ is my term for the operation of assigning something to a class, whether others would do so or not, and for the formation of classes in that way. This is an ordinary-language phenomenon; one sees a chipmunk and recognizes it as a chipmunk. One has available one’s personal class of chipmunks based on acquaintance with past chipmunks and what one knows of mammalian species or just pictures. This operation has an interesting relation to mathematics. Poincaré goes so far as to say “Mathematics is the art of giving the same name to different things.” It has been done successfully, and it has failed. It is avoided, and it can be done well (formation and representation of equivalence classes). But there is not even a standard term for it. It is the method of my essay, “Extreme Science: Mathematics as the Science of Relations as such” in the Gold/Simons MAA anthology, where I assimilate mathematics to the sciences. In the paper, I discuss assimilation in a historical way.

Glen Van Brummelen (Quest University)

Tools of the Table Crackers: Quantitative Methods in the History of Numerical Tables

The application of quantitative methods as a research tool in the history of the exact sciences in recent decades has been powerful, tempting, and fraught with danger. Given their structure, historical numerical tables provide a proving ground for quantitative analysis and a potential for insights concerning historical treatises, authors, and users; but these methods may be applied only extreme caution and vigilance. We shall survey attempts to “crack” historical numerical tables, attempting to classify the various goals of researchers, elucidating their methods, and exploring the historiographic implications. This paper represents joint work with Clemency Montelle and Matthieu Husson.

Maryam Vulis (NCC and York College CUNY)

Persecution of Nikolai Luzin

This presentation will discuss the life and work of the Russian mathematician Nikolai Luzin, who was denounced by the Soviet Government over his adverse views on the philosophy of mathematics. Luzin was involved in the early 20th century crisis of philosophical foundations of mathematics. He built on L. E. J. Brouwer’s intuitionist work. In particular, their rejection of the Law of Excluded Middle was condemned as contrary to Marxist dogma that every problem is solvable. Luzin was accused of following the traditions of the Tsar Mathematical School which among other transgressions promoted religion. Many important details of Luzin’s case came to light only recently. Even his famous students, Kolmogorov, Aleksandrov, and Pontryagin joined the vicious campaign, however despite the danger he faced, Luzin never renounced his position.

Xinlong Weng (University of Bridgeport)

Teaching Mathematical Ideas by the History of from Quadratic to Quartic Equations

Almost all of today’s textbooks in mathematics have solutions in the back of the book. What students need to do is to find those answers by using the methods learned from the class. Long time practice from elementary schools to colleges, students believed that all questions have answers. We don’t teach the history of mathematics on our campus, but I teach some history beginning with the quadratic equation continuing on with the quartic equation and ending with Galois Theory. I don’t teach students the techniques involved, but the history. More importantly, I am teaching the principle of mathematical research which is that we really don’t know in advance what is the right answer or if there is an answer at all. Students are excited to learn the possibility that there is not an answer, but they also learn that in order to claim that there is no answer, they have to prove that the problem has no answer. My experience has shown this piece of math history not just suitable for upper levels of engineering/science/math students, but also fits quite well into developmental mathematics courses.

Diana White (University of Colorado Denver)

Historical Accuracy, Popular Books, and Videos: Three Components of a History of Math Class

There are a myriad of approaches to teaching the history of mathematics, including which content to address and the instructional approaches to take to facilitate student learning. Over the past five years, the speaker has tried a variety of different approaches to both the content and implementation. In this talk, we discuss three of these implementation approaches: a historical accuracy activity, popular book assignments, and videos. For each of these, we discuss the rationale, implementation, assessment, student feedback, and instructor conclusions related to student learning. While these activities were implemented by the speaker in a course dedicated solely to the history of mathematics, they are also suitable for implementation in a variety of other courses that incorporate the history of mathematics in some capacity.

The speaker hopes that the audience will be interested in modifying some of these activities for their own use, in providing ideas and feedback to further push the speaker's thinking related to the activities, and in contributing to a discussion throughout the conference on how to use the history of mathematics to contribute to undergraduate mathematics education.

Maria Zack (Point Loma Nazarene University)

The Geometric Algebra of John Wallis

This talk discusses at Wallis' interest in the quadrature of curves using material from his books *Arithmetica Infinitorum* (1656) and *De Cycloide* (1659). The talk also considers how Wallis' work connected with the work of other mathematicians including Roberval, Wren and Newton.