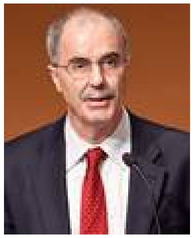
Mathematics Genealogy

Iztok Hozo

Ph.D. University of Michigan 1993



Hozo's Advisor: **Philip J. Hanlon**

Ph.D. California Institute of Technology 1981

After completing his postdoctoral work at the Massachusetts Institute of Technology, Hanlon joined the faculty of the University of Michigan in 1986. He moved from associate professor to full professor in 1990. He was the Donald J. Lewis Professor of Mathematics In 2010,, he was appointed the provost of the University of Michigan. In June 2013, he became the 18th president of Dartmouth College.

Hanlon's Advisor: **Olga Taussky-Todd**

Ph.D. University of Vienna 1930

Olga Taussky-Todd was a distinguished and prolific mathematician who wrote about 300 papers. Throughout her life she received many honors and distinctions, most notably the Cross of Honor, the highest recognition of contributions given by her native Austria. Olga's best-known and most influential work was in the field of matrix theory, though she also made important contributions to number theory.

Taussky-Todd's Advisor: **Philipp Furtwängler** Ph.D. Universität Göttingen 1896

Furtwängler's Advisor: **C. Felix (Christian) Klein**

Ph.D. Universität Bonn 1868

Felix Klein is best known for his work in non- euclidean geometry, for his work on the connections between geometry and group theory, and for results in function theory. However Klein considered his work in function theory to be the summit of his work in mathematics. He owed some of his greatest successes to his development of Riemann's ideas and to the intimate alliance he forged between the later and the conception of invariant theory, of number theory and algebra, of group theory, and of multidimensional geometry and the theory of differential equations, especially in his own fields, elliptic modular functions and automorphic functions.

Klein's Advisor 1: **Julius Plücker**

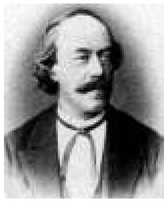
Ph.D. Universität Marburg 1823

Julius Plücker was educated at Heidelberg, Berlin and Paris. He made important contributions to analytic geometry and physics.

Plucker's Advisor : **Christian Ludwig Gerling**

Ph.D. Georg-August-Universität Göttingen 1812

Dissertation: *Methodi proiectionis orthographicae usum ad calculos parallacticos*



Klein's Advisor 2: **Rudolf Otto Sigismund Lipschitz**

Ph.D. Universität Berlin 1853

Rudolf Lipschitz worked on quadratic differential forms and mechanics. Lipschitz rediscovered the Clifford algebras and was the first to apply them to represent rotations of Euclidean spaces, thus introducing the spin groups Spin(n).

Lipschitz's Advisor: **Gustav Peter Lejeune Dirichlet**

Ph.D. University of Bonn 1827

Dirichlet proved in 1826 that in any arithmetic progression with first term coprime to the difference there are infinitely many

facilitandos explicavit simulque eclipsin solarem die
He was a student of the mathematician Karl Friedrich Gauß. Since 1817 he worked as an astronom in Marburg.

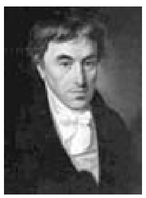
Gerling's Advisor:

Carl Friedrich Gauß

Ph.D. Universität Helmstedt 1799

At the age of seven, **Carl Friedrich Gauss** started elementary school, and his potential was noticed almost immediately. His teacher, Büttner, and his assistant, Martin Bartels, were amazed when Gauss summed the integers from 1 to 100 instantly by spotting that the sum was 50 pairs of numbers each pair summing to 101.
In 1798, he had made one of his most important discoveries - the construction of a regular 17-gon by ruler and compasses This was the most major advance in this field since the time of Greek mathematics and was published as Section VII of Gauss's famous work, *Disquisitiones Arithmeticae*. He published his second book, *Theoria motus corporum coelestium in sectionibus conicis Solem ambientium,* in 1809, a major two volume treatise on the motion of celestial bodies. In the first volume he discussed differential equations, conic sections and elliptic orbits, while in the second volume, the main part of the work, he showed how to estimate and then to refine the estimation of a planet's orbit.

Gauss's Advisor:



Johann Friedrich Pfaff

Ph.D.. Georg-August-Universität Göttingen 1786

Pfaff's inaugural dissertation was titled *Programma inaugurale in quo peculiarem differentialia investigandi rationem ex theoria functionum deducit.* It investigates the use of some functional equations in order to calculate the differentials of logarithmic and trigonometrical functions as well as the binomial expansion and Taylor formula. Pfaff did important work in analysis working on partial differential equations, special functions and the theory of series. He developed Taylor's Theorem using the form with remainder as given by Lagrange. In 1810 he contributed to the solution of a problem due to Gauss concerning the ellipse of greatest area which could be drawn inside a given quadrilateral.

Pfaff's Advisor:

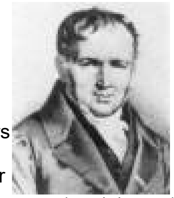
Abraham Gotthelf Kaestner

Ph.D. Universität Leipzig 1739

Perhaps the most important feature of Kästner's contributions was his interest in the parallel postulate which indirectly influenced Bolyai and Lobachevsky too. Kästner taught Bolyai's father and J M C Bartels, one of Kästner's students, taught Lobachevsky.

primes. Dirichlet is best known for his papers on conditions for the convergence of trigonometric series and the use of the series to represent arbitrary functions.

Dirichlet's Advisor 1:



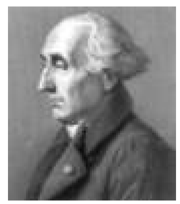
Simeon Denis Poisson

Poisson published between 300 and 400 mathematical works including applications to electricity and magnetism, and astronomy. His Traité de mécanique published in 1811 and again in 1833 was the standard work on mechanics for many years. His name is attached to a wide area of ideas, for example:- Poisson's distribution, Poisson's integral, Poisson's equation in potential theory, Poisson brackets in differential equations, Poisson's ratio in elasticity, and Poisson's constant in electricity.

Dirichlet's Advisor 2:

Jean-Baptiste Joseph Fourier

Fourier studied the mathematical theory of heat conduction. He established the partial differential equation governing heat diffusion and solved it by using infinite series of trigonometric functions.



Poisson's and Fourier's Advisor:

Joseph Louis Lagrange

Lagrange excelled in many topics: astronomy, the stability of the solar system, mechanics, dynamics, fluid mechanics, probability, and the foundations of the calculus. He also worked on number theory proving in 1770 that every positive integer is the sum of four squares. In 1771 he proved Wilson's theorem (John Wilson) (first stated without proof by Waring) that n is prime if and only if (n-1)!+1 is divisible by n. In 1770 he also presented his important work Réflexions sur la résolution algébrique des équations which made a fundamental investigation of why equations of degrees up to 4 could be solved by radicals. The paper is the first to consider the roots of a equation as abstract quantities rather than having numerical values. He studied permutations of the roots and, although he does not compose permutations in the paper, it can be considered as a first step in the development of group theory continued by Ruffini, Galois and Cauchy.

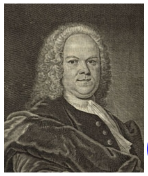
Lagrange's Advisor:

Leonhard Euler

Ph.D. Universität Basel 1726

Euler was the most prolific writer of mathematics of all time.
He made decisive and formative contributions to geometry, calculus and number theory. He integrated Leibniz's differential calculus and Newton's method of fluxions into mathematical analysis. He introduced beta and gamma functions, and integrating factors for differential equations. He studied continuum mechanics, lunar theory with Clairaut, the three body problem, elasticity, acoustics, the wave theory of light, hydraulics, and music. He laid the foundation of analytical mechanics, especially in his *Theory of the Motions of Rigid Bodies* (1765).
We owe to Euler the notation $f(x)$ for a function (1734), e for the base of natural logs (1727), i for the square root of -1 (1777), π for pi, Σ for summation (1755), the notation for finite differences Δy and $\Delta^2 y$ and many others.
In 1737 he proved the connection of the zeta function with the series of prime numbers.
One could claim that mathematical analysis began with Euler. In 1748 in *Introductio in analysin infinitorum* Euler made ideas of Johann Bernoulli more precise in defining a function, and he stated that mathematical analysis was the study of functions. In *Introductio in analysin infinitorum* Euler dealt with logarithms. He published his full theory of logarithms of complex numbers in 1751.

Kaestner's Advisor:

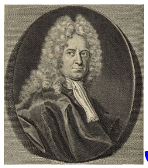


Christian August Hausen

Ph.D. Martin-Luther-Universität Halle-Wittenberg 1713

Hausen's book, *Novi profectus in historia electricitatis*, describes his triboelectric generator and sets forth a theory of electricity in which electrification is a consequence of the production of vortices in a universal electrical fluid.

Hausen's Andvisor:



Johann C. Wichmannshausen

Ph.D. Universität Leipzig 1685

His dissertation, titled *Disputationem Moralem De Divortiis Secundum Jus Naturae* (*Moral Disputation on Divorce according to the Law of Nature*), was written under the direction of his father in law[1] and advisor Otto Mencke

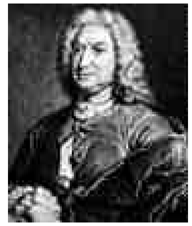
Wichmannshausen's Andvisor:

Otto Mencke

Ph.D. Universität Leipzig 1665, 1666

He is notable as being the founder of the very first scientific journal in Germany, established 1682, entitled: *Acta Eruditorum*.

Euler's Advisor:



Johann Bernoulli

1694

Bernoulli was de l'Hôpital's tutor. However it did assure de l'Hôpital of a place in the history of mathematics since he published the first calculus book *Analyse des infiniment petits pour l'intelligence des lignes courbes* (1696) which was based on the lessons that Johann Bernoulli sent to him (without acknowledging that fact). The well known de l'Hôpital's rule is contained in this calculus book and it is therefore a result of Johann Bernoulli. Bernoulli also made important contributions to mechanics with his work on kinetic energy

Johann Bernoulli's Advisor:

Jacob Bernoulli

1676

Jacob Bernoulli's first important contributions were a pamphlet on the parallels of logic and algebra published in 1685, work on probability in 1685 and geometry in 1687. His geometry result gave a construction to divide any triangle into four equal parts with two perpendicular lines.

By 1689 he had published important work on infinite series and published his law of large numbers in probability theory. The interpretation of probability as relative-frequency says that if an experiment is repeated a large number of times then the relative frequency with which an event occurs equals the probability of the event. The law of large numbers is a mathematical interpretation of this result. Jacob Bernoulli published five treatises on infinite series between 1682 and 1704. The first two of these contained many results, such as fundamental result that $\sum(1/n)$ diverges, which Bernoulli believed were new but they had actually been proved by Mengoli 40 years earlier. Bernoulli could not find a closed form for $\sum(1/n^2)$ but he did show that it converged to a finite limit less than 2. Euler was the first to find the sum of this series in 1737. Bernoulli also studied the exponential series which came out of examining compound interest.

In May 1690 in a paper published in *Acta Eruditorum,* Jacob Bernoulli showed that the problem of determining the isochrone is equivalent to solving a first-order nonlinear differential equation.