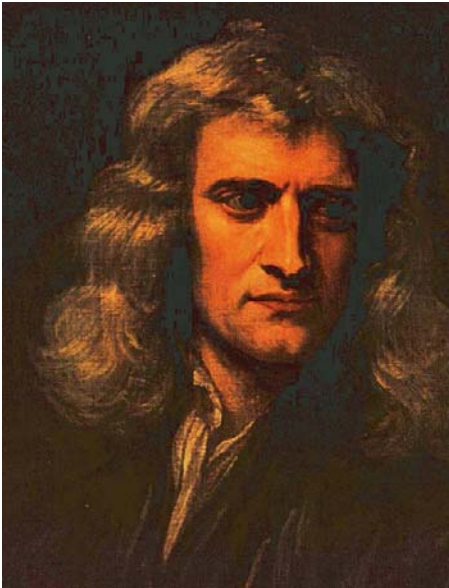


Newton and Leibniz

PRIORITY WAR: DISCORD IN PURSUIT OF GLORY

Eminent physicist plans anonymous character attack on dead rival in bitter priority dispute

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London, 16 January 1717. A fresh volley in a war waged since the turn of the century is about to be fired by Sir Isaac Newton, president of the Royal Society. The conflict is over who invented the calculus. Here at his home in the fashionable heart of London, Newton and his associates are gathered at dinner. They are busy planning the republication of a much-expanded *History of fluxions*, a book that charges the German philosopher Gottfried Wilhelm Leibniz with pirating Newton's work more than 40 years ago and eventually stealing claim to the calculus.

Preparations for the **broadside** have been touched off by the news, recently arrived, that Leibniz died last November at the age of 70 in Hanover, Germany.

Leibniz just two decades ago was hailed throughout Europe as the inventor of the calculus. His work, performed in 1675 and first published in 1684, was quickly elaborated by continental mathematicians, and Leibniz was soon their undisputed doyen. Powered in part by his work on "differentials", Leibniz moved with ease through the great courts of Europe. His empire started to crumble in 1695, however, when bits of Newton's long-dormant work began to be published. Briefly, each scholar held out the possibility of agreeing to share the invention, but the partisans of each prevented an amicable settlement. By 1699, young champions of Newton's were insinuating plagiarism.

The ensuing battle, each side charging piracy, has been fought for the most part by the throng of little squires that surround the two great knights. The upshot of this conflict is that Leibniz's notation is universally used, but Newton is now considered first Inventor. Charges of piracy are unresolved and have done much damage to Leibniz's career. He always aspired to something greater than his job as librarian to the Court of Hanover, and when the Hanoverian George I was crowned King of England in 1714, Leibniz

longed to be named royal historiographer. This might have come to pass had it not been for Newton's long-standing charges of flagrant falsification of scientific history.

It is said that when Leibniz died last November, the only official mourner at his funeral was his servant. "He was buried," said an eyewitness, "more like a robber than what he really was, the ornament of his country."

Reliable sources report that many of the volleys that have been fired by the little squires over the years are in fact penned or promoted by the principals and this continues to be the case. The about -to-be published *History of Fluxions*, for instance, is attributed to another but is being assembled and watched over by Sir Isaac himself. Similar stratagems have been used by Leibniz. It is no small irony that these learned men with their common commitment to the advancement of scientific truth have behaved like rogues, anonymously publishing unseemly innuendoes and bald-faced lies in books and learned journals. As one observer of the battle has noted: "They have behaved like gladiators in a Roman circus."

Such was not always the case, especially with Newton. At one time he made great sacrifices to avoid any kind of confrontation, be it a priority fight or, in his frail, dreamy, solitary childhood, a schoolyard scuffle, ordinarily passive and fearful, the youthful Newton one day gave special evidence of his deeper character, however, the school bully finally went one step too far, and Newton not only thrashed him, but, urged on by the schoolmaster's son, dragged him to the church by the ears and there rubbed his nose against the wall.

As a young scientist, the reclusive Newton was slow to tout his successes, and when he first did, the reaction of the scientific community was negative. In 1665-1666, around the age of 23, Newton discovered the calculus, the nature of white light, and the theory of gravitational attraction. Some 7 years later, while an instructor at Trinity College, Cambridge, Newton sent his first paper to the Royal Society, describing how white light is composed of monochromatic lights that can be separated with a prism - an opinion at odds with the view of the day. Scientists with established reputations launched violent attacks against the young Newton. "I was so persecuted with discussions arising from the publication of my theory of light," Newton recently recalled, "that I blamed my own imprudence for parting with so substantial a blessing."

Newton did not again take pen to paper on his own initiative for some time, and only published in 1687 his famed *Principia*, which established the gravitational laws of the universe, after astronomer Edmond Haley put to the Cambridge professor a technical question that London mathematicians had failed to solve.

A mid-life crisis helped put an end to the shy, reclusive scientist that dabbled in alchemy and the occult and ushered in a more self-assertive Newton. The crisis was touched off in 1689 when Newton's mother died. At the time, she was perhaps the only person to whom he was really close. In 1693 he suffered a complete nervous collapse. Newton broke with associates, accused friends of plotting against him, slept little, and reported conversations that did not take place. The crisis lasted 2 years. When it subsided, an appointment from the King abruptly changed his life. Newton was named Warden of the Mint in 1696 and soon thereafter left his bachelor quarters at Trinity and set up house with his niece Catharine Barton, a charming and much pursued woman about London. Then in quick succession he was promoted to Master of the Mint, was elected president of the Royal Society, and was knighted.

The aloof scholar with a mystical bent was being transformed into a Machiavellian power of London society. He was seen more often in coffeehouses after meetings of the Royal Society. He appeared at Court. He attended opera. He lived where the wealthiest and most substantial classes resided. He grew corpulent. Today Newton can be observed being carried about the city in a sedan chair, his pink face smiling beneath a mass of snow-white hair.

The battle for priority with Leibniz erupted in the midst of Newton's materialistic rise. The first serious volley was fired in 1699 by Fatio de Duillier, a young admirer of Newton's who suggested in print that Leibniz may have borrowed from Newton. Leibniz reacted with gentle rebuke rather than treating Fatio like a rogue, "for it would be a ridiculous spectacle, I think, if learned men who profess higher standards than others should exchange insults like fishwives," a Leibnizian sentiment that did not last. There is no evidence that Newton was responsible for Fatio's first salvo, but once it was fired, Newton became totally enmeshed in the priority fight.

Leibniz was soon claiming chronological priority for the Leibnizian calculus, and the fight was in full swing. In addition, Leibniz made a concerted effort to discredit Newton's rival notions of matter, substance, the cosmos, God's Providence, time, and space. Leibniz especially attacked Newton's theory of gravitational attraction. In the Cartesian tradition, Leibniz instead envisioned a billiard ball universe where every action had a mechanical cause. A force, such as gravity, was to Leibniz a kind of optical illusion. "He who would show that the laws of astronomy can be explained on the supposition of a mutual gravitation between the planets will have done something very worth while," wrote Leibniz, "even though giving no explanation of gravity. But if having reached this fine discovery he thinks he has provided an adequate cause and nothing else remains to be found out, he relapses into physical barbarism and the occult qualities of the Schoolmen."

In 1710 Newton took the offensive when his surrogate, John Keill, a secretary of the Royal Society appointed by Newton, charged that Newton had "discovered the method of fluxions at least 18 years before Leibniz had published anything on differential calculus. "He also charged without any caveats that Leibniz had plagiarized Newton.

Leibniz, a foreign member of the Royal Society, demanded an apology. What he got instead was the *Commercial Epistolicum*, a series of Latin documents published in 1712 and a commentary by an "impartial. Committee of the Royal Society on who first discovered the calculus, but the committee was not impartial at all. It had been stacked by Newton, who took advantage of his position as president of the Royal Society to select what he later called a "Numerous Committee of Gentlemen of Several Nations." The nations represented were English, Scottish, Irish, and, as one observer put it, "a Prussian ambassador and a Huguenot emigre thrown in for continental flavor. Surprisingly enough, the committee adjudicated in favor of its own president, insinuated plagiarism, and found Leibniz guilty of concealing an alleged knowledge of the prior work of Newton. Despite the premise of impartiality, the report was only signed by the committee. It had in fact been drafted by Newton himself, who had the gall to observe anonymously in the preface that "no one is a proper witness for himself" and that it would be an iniquitous judge "who would admit anyone as a witness in his own cause."

Insinuations of plagiarism were supported in *Commercium* by reference to a letter that Newton wrote in 1672 on the development of the calculus, a letter that Leibniz allegedly saw and studied before his "discovery" of the calculus in 1675. There was just one problem: Leibniz, possibly unbeknownst to Newton, never saw the letter. He merely came in contact with an abridgement of it as apart of a large packet of news about what mathematical research was being conducted in England at that time. The letter in question had been condensed to a few uninformative lines.

Though Leibniz started on a rebuttal, it never appeared in print. This may have been partly because he was never allowed to examine the Royal Society's collection of documents.

Nevertheless, the Leibnizian forces went on the offensive, broadening the quarrel to cast aspersions on Newton's competence as a mathematician. In particular, the *Principia* was assailed and every effort was made to convict Newton of error and ignorance, Leibnizian partisans arguing that so feeble a mathematician could not conceivably have devised the calculus, Leibniz's chief lieutenant in this attack was the distinguished Swiss mathematician Johann Bernoulli. Bernoulli discovered a place in the *Principia* where Newton's answer to a problem entailed an absurd consequence that Sir Isaac had failed to notice. Rather than answering the criticism, however, Newton merely revised the *Principia* when the next edition came out, removing the error and giving no credit to Bernoulli for having pointed out the problem.

Just 4 years ago, Leibniz himself went on the offensive, anonymously publishing a pamphlet, the *Carta Volans*, that contains a summary of Bernoulli's criticism. Soon copied into various learned journals in several languages, it also charged for the first time that Newton had in fact been the one to snatch the calculus. While Newton in *Commercium* appealed to private prehistory to assert his claim, Leibniz in *Carta Volans* points to the public record of the enormously successful development of the calculus in association with himself to demonstrate his possession of rights.

Of late, Newton has published several anonymous tracts that add nothing essentially new to the dispute, and, when he recently learned of Leibniz's death, began preparations for the republication of the *History of Fluxions*. Using his dominant position in the Royal Society, Newton seems ready to continue this sordid campaign in which he never appears publicly but which he masterminds.

Why the obsessive attacks? Some observers feel that Newton is always able to convince himself that his rival has sinned against the truth and the unique revelations that have come to Sir Isaac. Wasn't Newton born on Christmas day? Isn't it true that a male child born after his father's death is endowed with supernatural powers? Some observers suggest that Newton thinks himself divinely inspired. It is rumored, in fact, that Newton rejects the divinity of Christ - a crime that is of course punishable with at least loss of office and possibly death. And if Christ is not God's only son? At the bottom of a stray paper found in Sir Isaac's chambers is scribbled a near anagram of his name that translates as "God's holy one." *Isaacus Neutonus- Jeova sanctus unus*. It seems there is no room in divinity or in the invention of the calculus for a second son. Newton has written, "The sole Right is in the first Inventor until another finds out the same thing apart. In which case to take away the Right of the first Inventor, and divide it between him and that other, would be an Act of Injustice."

William J. Broad

ISAAC NEWTON, OLD AND NEW

One popular conception of Newton is that of a scientist too lofty to be anything but self-deprecating, an image perhaps best called up by the quote "If I have seen further it is by standing on the shoulders of giants."

In addition to that conception, another has taken shape during the past decade. Two books in particular, one published in 1968 and the other in 1980, when read back to back, reveal a deeply divided man filled with conflicts and insecurities that heretofore were overshadowed by his genius. Nowhere are these insecurities seen more clearly than in the dispute over who first invented the calculus. Revealed is a Newton who needlessly twisted historical truth and penned anonymous character attacks in the pursuit of scientific glory.

The calculus dispute as reported in the accompanying dispatch relies in the main on facts drawn from these two books. The first, by Frank E. Manuel, is *A Portrait of Isaac Newton* (Harvard University Press, 1968; reissued by New Republic Books in 1979). Manuel helps answer why Newton waited more than 30 years before laying claim to the calculus and why he continued to be obsessed with the denigration of Leibniz long after the German philosopher was dead. Manuel observes: "The violence, acerbity, and uncontrolled passion of Newton's attacks, albeit directed into socially approved channels, are almost always out of proportion with the warranted facts and character of the situations."

Manuel seeks clues in childhood events to Newton's self-righteous outbursts, in particular, in Newton's unusual birth. On that occasion in 1642 his father was already long in the grave, the moon was full, and the day was Christmas. His birth was premature, and later in life Newton was told that his survival had been miraculous.

The second book, by A. Rupert Hall, is *Philosophers at War* (Cambridge University Press, 1980). It deals exclusively with the calculus dispute, and, while short on speculations about underlying drives, is a compendium of the hidden dynamics of one of history's great rivalries. Hall shows, for instance, that many of the volleys seemingly fired by partisans in the dispute are in fact clandestinely penned or at least overseen by the principals.

None of which detracts in the least from the just reputation of Newton and Leibniz as independent discoverers of the calculus or, moving back from the priority dispute a bit, even from them as human beings. The work of the past decade is additionist rather than revisionist. It tends to reveal details that flesh out rather than replace old idols. With Newton in particular, some of the details of his emerging personality are unseemly. It is also the case, however, that the better known, more becoming aspects of Newton remain unchanged. "To myself," he wrote later in life to a friend, "I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay undiscovered before me."

W.J.B.