The Mathematical Sciences in Groningen before and after Bernoulli’s Stay

Gerard Sierksma
Department of Econometrics, University of Groningen
P.O. Box 800, 9700 AV Groningen, The Netherlands


The Dutch 16th Century Tradition of Useful Sciences
One might wonder how the University of Groningen managed to hire the famous Johannes Bernoulli (1667 – 1748), and keep him during ten turbulent years from 1695 to 1705. One might also wonder what the impact of his stay has been on the development of the mathematical sciences in Groningen in the period after him. In order to shed some light on these two questions, we need to paint the situation at the University of Groningen in the period before and after Bernoulli’s stay. The conclusion will be that during the first three hundred years of the university, Bernoulli was actually the only one who was interested in the development of mathematics, while all the other mathematics professors were interested in it as long as it could be used and applied. The University of Groningen can therefore be ranked in the Dutch tradition of the sixteenth century where sciences are tolerated as long as they are useful. This is certainly a disappointing conclusion. However, the period 1600 – 1900 contains a number of interesting personalities and anecdotes that may clarify the aversion from fundamental research in mathematics.

Hope of the Future
On the 23rd of August 1614 the official inauguration of the new university took place in the Martini church in Groningen. The inhabitants were eager to see the three professors, on which “the hope of the future was built”. When the dignified procession left the church, the throng of the curious and interested crowd was so large that the professors in the procession could barely move. They first went to the house of Nicolaus Mulerius, who was the professor in medicine and mathematics.

More Medical Doctor than Mathematician
Nicolaus Mulerius (1564 – 1630) was the first professor in Groningen in the...
mathematical sciences. He was appointed on a salary of 800 Dutch guilders per year, plus 100 Dutch coins for the rent of his house and 50 guilders for fire insurance. Mulierius remained a professor until his death in 1630, the year Johannes Kepler also died. Like Kepler, he was more an astronomer than a mathematician. Mulierius was born in 1564 on Christmas day in Brugge from Reformed Church parents. The persecution by the Inquisition did not pass the Mulierius family by. When soldiers surrounded the house father Pierre was able to escape in a forest together with his son Nicolaus, but mother Claudia was captured and died as a martyr a year later. Father and son went to Leiden, where Nicolaus studied medicine and mathematics. Before Nicolaus was appointed in Groningen, he was already a renowned scientist, but not really a mathematician. He wrote several booklets, mostly in Dutch "...in order to show that mathematics is not only useful for those who understand Latin, but also for many other Citizens, Merchants, Skippers, Chief mates, and all those who are interested". This sentence is characteristic for Mulierius. It is from the introduction of the booklet "Short Education of the Use of the Astrolabes, containing the Table of Sine". In his "Celestial Trumpet and Morning-alarm or Comet with a Long Beard" Mulierius warns those who live dissolutely against the wrath of God, in which he seems to be more interested than in the orbit of
the comet. Mulierius succeeded his friend Ubbo Emannus as Rector Magnificus of the university in 1617.

THREATENING WITH ACCEPTING A POSITION IN HARDERWIJK
Immediately after Mulierius' death in 1630, his place was taken by Mathias Pasor (1599 – 1658), who was already professor in Ethics in Groningen since 1629. Before his appointment in Groningen, this dignified German-born scholar was professor in Arabic languages at Oxford. Although he had to teach mathematics, it was apparent that this was not his great love. Under the pressure of accepting an appointment in Theology and Hebrew in 1645 at the University of Harderwijk, the Groningen Board of Governors released him of his mathematics lecturing burden, so he could devote all his time to Theology, in which he became a prominent scholar.

TWO 'SONS OF THE FLAT GRONINGEN COUNTRYSIDE'
Despite all this, Mathias Pasor had a major impact on two 'sons of the flat Groningen countryside'. These were the brothers Johannes and Joachim Borgesius. Johannes (1618 – 1652) became a student of Pasor in 1634, a year after the conviction of Galileo Galilei. As a student he calculated each year the calendar with the positions of the heavenly bodies as seen from the altitude of Groningen. So his predilection for applied mathematics dates from his youth. These calculations delivered him a teaching assistantship in Mathematics at the university. In 1646, the year of the birth of Gottfried Wilhelm Leibniz, he obtained the 'Chair of Mathematics', which was founded after the resignation of Pasor. In this sense, Johannes Borgesius can be considered as the first full-time mathematics professor in Groningen. Although he did not write important mathematical papers or books, undoubtedly caused by his weak health and the fact that he was almost blind, he has been an inspiring and diligent teacher. The last years of his life he suffered a brain illness that deprived him of his thinking and speaking abilities. He died in 1652, only 34 years old.

His seven years younger brother Joachim Borgesius (1625 – 1666) became a student of Pasor in 1642, the year of Galilei's death. At the age of 28, Joachim was appointed professor extraordinarius in Groningen. He combined Mathematics with the subject of Eloquence, and seems to have been more interested in the latter. After obtaining the doctoral degree in Philosophy and Philology in 1655, he succeeded his brother as ordinary professor in Mathematics and Eloquence. From 1666 to 1661 he was Secretary of the Senate, and during the school year of 1663/1664 Rector Magnificus. The times were very rough. In 1665 Groningen was threatened by an attack of the Bishop of Munster, and in the city the plaque broke out. Many people died, and only 39 new students were registered. Six years after his appointment Joachim Borgesius died.

YEARS OF CRISIS
During the next thirty years the university went through a deep crisis. Few new professors were appointed, the number of theological quarrels reached a peak,
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<thead>
<tr>
<th>Name</th>
<th>Period</th>
<th>Subjects</th>
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<tr>
<td>Nicolaus Mulerius</td>
<td>1614 – 1630</td>
<td>Medicine, Mathematics.</td>
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<tr>
<td>Matthias Pasor</td>
<td>1629 – 1658</td>
<td>Ethics *(During '30 – '45 also Mathematical Sciences. *(From '45 only.) Theology.</td>
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<tr>
<td>Johannes Borgesius</td>
<td>1646 – 1652</td>
<td>Mathematics.</td>
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<td>Johannes Bernoulli</td>
<td>1695 – 1705</td>
<td>Mathematics. Philosophia Experimentalis</td>
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<tr>
<td>Johannes Petrus de Crosa</td>
<td>1724 – 1726</td>
<td>Philosophy, Mathematics.</td>
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Table 1. Mathematics Professors 1600 – 1900

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<tr>
<th>Name</th>
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<th>Courses Offered</th>
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while the number of students reached a low point. Followers of the Cartesian dogma were denounced, and some professors actively encouraged students not to take classes from certain colleagues. But even more than the theological disputes, jealousy and malice about salary demands poisoned the academic climate. The animosities went sometimes so far that professors used violence against each other.

During these years of decline only Johannaes Bertling (1626 – 1690) was appointed in the mathematical sciences. Bertling was born in Groningen in 1626 during a short stay of his German parents in Groningen. He was a devoted mathematician, and was in 1667 appointed as successor to Joachim Borgesius. His conviction of the usefulness and necessity of mathematical sciences was barely shared by his colleagues. Two years after his appointment he was already dismissed from teaching mathematics and charged with Philosophia Practica. He was a follower of the Aristotelian philosophy, and stayed in Groningen till his death in 1690.

The further history of this bleak period narrates of only incidental attention to the mathematical sciences. In 1679 Johannes Stauenberg was appointed as Reader in Mathematics "in order to support the professors", although – ironically – there was no mathematics professor. In 1686 a former Italian monk, named Thomas Astoria, requested that the Senate grant him a reading mandate in Mathematics and Philosophy. He was appointed Lecturer, even though he was only a Medical Doctor. However, when he announced to start
his first lectures, the Senate decided to postpone the start because of the severe winter cold. They referred thereby to the custom that by severe cold the winter vacation could be extended. The former monk used this delay to announce that he would start his lectures two days later, thereby extending—on his own account—his reading mandate with Metaphysics and Anatomy. This made the Senate upset, and curiously judged that he was allowed to teach only mathematics and to use no other title than Medical Doctor unless he could prove to have the diploma of Doctor in Mathematics and Philosophy.

The interest in the mathematical sciences, including its practical use, went to a very deep point in Groningen. This was also the case outside the university. A 'school order' of 1654 mentions that teachers should have a reasonable knowledge of reading, writing and singing; arithmetic, on the other hand, was only required when it was necessary for the position.

**The Darkest Hour is Before the Dawn**

In the year 1693 the university came to the conclusion that something needed to be done. The proposal was to appoint three already famous professors, one in Theology, one in Law, and one in Mathematics. On the instigation of Guillaume François Marquis de l'Hôpital and Christiaen Huygens, the famous Johannes Bernoulli (1667–1748) from Basel was appointed. Bernoulli was quite willing to accept the offer, not only because of the high salary of about 1200 Dutch guilders, but also because Leibniz had told him about the many mathematicians in Holland. The expectations turned out to be very disappointing. A year later, Bernoulli wrote to Leibniz: "I cannot possibly imagine why you wrote me about the numerous mathematicians who are supposed to live here; I have not come across one single mathematician, not even a mediocre one". Bernoulli left Groningen disillusioned in 1705. Why it took almost ten years to find a successor remains a mystery. However, his introduction of *Philosophia Experimentalis* in Groningen, by which physical phenomena are interpreted by means of experiments, together with the fact that he did his experiments in the choir of the Academy church, provoked fierce opposition from his Calvinist fellow citizens. Both ministers and colleagues clamored against the desecration of the church. Bernoulli answered furiously: "Nowhere is God's power and wisdom more evident than in the study of his works and none are better equipped for this study than the philosopher and mathematician, who tries to fathom both the nature and character of God's works." This somewhat opinionated and not very tactful behavior of Bernoulli did certainly not contribute to a willingness of speeding up the procedure for appointing a new mathematician.

**After Bernoulli: A Dancing- and a Fencing-Master**

Bernoulli's outstanding scholarship, together with his large degree of self-conceit, was perhaps too much for the university rulers of that time. In 1716 a certain ironic turn seemed to take place. The Curators proposed to appoint Bernoulli a second time. He was then a professor at Basel. Bernoulli declined the offer without comments. The eyes of the Curators then fell on a certain Wittichius, but no decision was taken, a riding-master, a dance-master and a fencing-master
had higher priority, although their appointments required a year of deliberations. It took another seven years to appoint a professor of mathematics.

Two Years of Revival
Johannes Petrus de Croes (1663 – 1750) was the second Swiss scholar to be appointed professor in Groningen. He was appointed in 1724 on the recommendation of Bernoulli, but almost twenty years after his departure. In his recommendation, Bernoulli was perhaps led by the idea that Groningen wanted to have a mathematician similar to himself, but religiously more orthodox than himself. De Croes indeed satisfied these conditions. He was an eminent scholar, and wrote a large number of papers and booklets, including a number of mathematical papers such as 'Comment on the Analysis of the Infinitesimals of De l'Hôpital' and 'Treatise of Algebra'. He was professor of Philosophy in Lausanne since 1700. In 1707 he also became vicar, and in 1710 he extended his activities with the chair of Mathematics. After a stay of only two years in Groningen, he accepted the honorable position of Governor of Prince Frederick of Hessen-Cassel. In 1735 he accepted the chair of Philosophy in Lausanne, which he had left for Groningen eleven years before.
The Thunder Storm Machine
After the unsuccessful call on Bernoulli and the two years stay of De Cosa, yet another Swiss mathematician in succession was appointed. Nicolaas Engelhard (1696 – 1765) came to Groningen in 1728. As an admirer of Leibniz, he was suspect in the eyes of a number of colleagues. Soon an occasion was found to accuse him of heresy; his ideas about the rotation of the earth did not agree with the dogma's of the church. Especially the theology professor, Antonius Driessen, exchanged a number of aggressive pamphlets with Engelhard. One of Engelhard’s pamphlets written in 1737 was named ‘Short but Serious Investigation concerning the Difference, in what Way the Holy Bible should be agreed with the Supposition of the Movement of the Earth’. However, the fighting never became personal, probably due to the amiable and friendly personality of Engelhard. Finally the storm passed and Engelhard was recognized as an original, profound and scrupulous scholar. He became professor in the History of Philosophy, Logic, Physics and Metaphysics, Physical Geography, and Advanced and Elementary Mathematics. The mathematics was taught according to the Institutiones Weideli. The Dutch Academy of Sciences appointed him as a member in 1755. He preferred to teach from his own lecture notes. He was one of the founders of the Groningen Society Pro Excolendo Jure Patrio. Engelhard died from a stroke during a walk in 1765, 69 years old. During his life Engelhard administered the Instrumento Mathematico, including certain instruments used by Bernoulli for his Philosophia Experimentalis. We mention three instruments on a list from 1738: one instrument for demonstrating that a body rolling in a cycloid falls in shorter time from one point to another point than when it rolls in a straight slantingwise conduit pipe, one instrument to demonstrate that a body thrown in a slantingwise conduit pipe follows a curve called a parabola, and a thunder storm machine for simulating a hail-storm.

'About the First Construction of the Dikes ...'
Engelhard was succeeded by Antonius Braugmans (1732 – 1789). When he was only fourteen years old, he became a student in Franeker, and studied the mathematical and physical sciences. At eighteen he was conferred the doctor's degree in Mathematics and Physics. This gained him a prize offered by the Provincial Legislation of Friesland for those who have the doctor's degree before the age of eighteen. In 1756 he accepted the chair in Philosophy at Franeker. In 1797 Braugmans moved to Groningen where he succeeded Engelhard. Soon after his arrival he became a member of Pro Excolendo Jure Patrio. Braugmans taught Logic and Metaphysics, using textbooks written by Engelhard. His lectures on advanced and elementary mathematics were based on the works of Euclid and Wolff. For his Philosophia Experimentalis classes, he used the lecture notes of Musschenbroek and Engelhard. Braugmans wrote many scientific papers, all in Dutch. By the time of his death, caused by cancer, two publications were still in press. One was named 'On the Measures and Weights', and an essay named 'About the first Construction of the Dikes and the Condition of the Country before this'.

Braugmans was the first professor in Groningen who had a mathematician as
a colleague. Frederik Adam Widder (1724 – 1784) was already a student in Groningen in 1744. He received his doctoral degree in Philosophy under Engelhard. Widder had been an extraordinary professor since 1769; a sudden illness delayed the presentation of his oration by about two years. In 1773 he became ordinary professor. Widder was a very amiable man, beloved by colleagues and students. His mathematical contributions concerned the teaching of algebra.

THE FRENCH YOKE
How long should one continue in listing professors who were in one way or the other engaged with mathematics but, except for Bernoulli and De Cossa, not really interested in it. With the death of Brugmans in 1789 we are already 84 years after the departure of Bernoulli. Money can not have been the problem. The offer of Prince Willem IV of Orange to increase the number of professors was never used, although Groningen was very much a supporter of the House of Orange. Prince Willem V visited Groningen several times, and when the Prussians came in 1787 the city council invited the people to wear orange bows. In 1795 the billeting of the French army begun. The professors had to billet French soldiers in their homes as well. In 1811 the university, which was then a Provincial Academy, changed into an Academy of the Imperial University of Holland. Only the University of Leiden was honored with the same status. The academies in Utrecht, Amsterdam and Deventer were relegated to the status of secondary schools. In 1813 the yoke of the French University was thrown off. The bi-centennial of the university was celebrated enthusiastically. There was an allegorical parade with a float pulled by horses. On one of the horses was sitting the 'Philosophy', performed by an old man with a sphere in his left hand, and pair of compasses and a paper roll with mathematical formulas in his other hand.

DYING IN A CLASS ROOM
During this period Jacob Baart de la Faille (1757 – 1823) was in charge of the education of Mathematics. Already at the age of twenty he became a teacher in mathematics and physics, and in 1790, Baart de la Faille succeeded Brugmans. Besides teaching Mathematics and Astronomy, he also taught the Philosophia Experimentalis, which was then called Experimental Physics. Except for his dissertation and a number of orations, his 'Treatise of Arithmetic', which he wrote together with his father, has been published in Dutch. He was a passionate teacher, much so, that during his illness, he needed to be carried into the lecture rooms where he also finally died.

MATHEMATICAL ENGINEERS
The language of the exams and doctoral thesis defenses was Latin, except those for military engineering and land surveying. The priority given to applied mathematics is not only clear from the fact that, except for Bernoulli and De Cossa, only teachers were hired, but also from the list of exams and promotions. In the eighteenth century there were 29 such exams, all in Dutch. For instance, in 1808 Gerrit Kuyper from Groningen was promoted by Baart
de la Faille to land surveyor, fortification engineer, gauge-of-wine-casks engineer, and hydraulic engineer. Earlier, in 1617, Jacob Stijp and Thomas van der Burgh were promoted by Mulerius in Geometry and the Art of Fortification.

MEMBER OF PARLIAMENT
Baart de la Faille was succeeded by Seep Brouwer (1783 – 1856). During his short career as a mathematics professor, from 1823 to 1835, he wrote a textbook in Dutch on spherical trigonometry. On page three he wrote: "In our Fatherland the yard is used, which is dependent on the size of the globe, (...) so that it will never get lost as long as our earth will not change drastically". He continues with a warm plea for introducing the yard in all of Europe, and in a nonconformist mood he calls for breaking away from 'sticking to the old', the 'arbitrary' and the 'uncertain'. Brouwer was politically very engaged. He gave half of his salary to charity, and retired without claiming his pension. From 1842 to 1845 he was a Member of Parliament.

THE FIRST CHAIR IN PHYSICS
Brouwer was succeeded by Jan Willem Ermerins (1798 – 1860), mathematics professor from 1835 to 1868, also in charge of Physics Theorica and Experimentalis. In 1847 Willem Adriaan Enschedé (1811 – 1869) became his colleague, in charge of Advanced Mathematics and Physics. The fact that he had to teach mathematics was a disappointment for him, because he considered himself a physicist. Perhaps therefore he never wrote any scientific paper and his main activity besides teaching was the management of the library. Enschedé was professor until 1881. The Physics Experimentalis was taught for the last time by Ermerins' successor Rudolph Adriaan Mees (1844 – 1885), who can be regarded as the first professor in Physics. In 1877, Hendrik Jan Rink (1847 – 1883) became the second mathematician besides Enschedé. Pieter Hendrik Schoute (1846 – 1913) succeeded Enschedé in 1881, and Floris de Boer (1846 – 1909) succeeded Rink in 1884. With the appointment of Schoute a new and flourishing period started. With Floris de Boer we finish the parade of Groningen mathematicians. De Boer was professor from 1884 to 1908. He wrote several mathematics books and papers, and was very much interested in the history of mathematics. In 1896, he wrote "The Bernoulli Family in the History of Mathematics" in which he especially highlights the work of Johannes Bernoulli, his brother Jacobus, and his son Daniel, born in Groningen in 1700. Perhaps somewhat embarrassed by paying only attention to the male part of the family, De Boer mentioned at the end of this work that "... it is very much regrettable that the history mentions nothing more of Margaretha Schänauer (the mother of Johannes Bernoulli) other than that she had eleven children and died rather young".

PAUL R. Halmos
In the almost three hundred years between 1600 and 1900 only one mathematician with an international reputation worked at the University of Groningen (the two years of De Cossa can be neglected). Bernoulli's stubborn character
contrasted with the other mathematicians who were more teachers than researchers. The question might be: What do we prefer, a stubborn scholar or an amiable teacher?

Paul R. Halmos, who presents the 1993 - 1994 Johann Bernoulli Lecture, is not a combination of these two; he is both an amiable teacher and an amiable researcher. This paper is dedicated to him.

REFERENCES