# Hidden Authors*

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**Abstract**

Published cases will be discussed in which the official authors are not identical with the original authors. This reaches from simple plagiarism to the proud statement 'Good artists copy, great artists steal. - I have stolen'. But more interesting are the more subtle facets of the phenomenon like taking advantage of hierarchical structures, influence of group dynamics, using magic caps to discriminate or to bypass discrimination, concealing or inventing real or virtual (co-)authors or playing jokes. It is not intended to give a complete picture but to show a variety of different cases.

**Verborgene Autoren:** In diesem Artikel werden publizierte Fälle diskutiert, in denen die aufgeführten Autoren nicht die tatsächlichen oder die einzigen sind. Der Bogen spannt sich von simplem Abschreiben bis zu der stolzen Behauptung: 'Gute Künstler kopieren, große Künstler stehlen. - Ich habe gestohlen!'. Interessanter sind aber die weniger bekannten, subtileren Facetten dieses Phaenomens wie Ausnützung hierarchischer Strukturen; Einfluß von Gruppendynamik; Benutzung von Tarnkappen zur Ausübung oder zum Unterlaufen von Diskriminierung; Verschweigen oder Erfinden von (Ko-)Autoren, realen und virtuellen. Es wird keinerlei Vollständigkeit angestrebt – wohl aber möglichst große Vielfalt.

## 1 Plagiarism and the like

There seems to be no need to discuss plain plagiarism in length, because or though it seems to occur all the time and everywhere. We all know that the seriousness of cases varies from very bitter and even life-threatening like the controversy Newton-Leibniz[1] to cases which are harmless in comparison.

*slightly revised version of pp. 394-429 In: Wolfschmidt, Gudrun, ed.: *Festschrift – Proceedings of the Christoph J. Scriba Memorial Meeting - History of Mathematics.* Wissenschaftliches Kolloquium und Tagung der Fachgruppen Geschichte der Mathematik in der Deutschen Mathematiker-Vereinigung (DMV) und der Gesellschaft für Didaktik der Mathematik (GDM), Hamburg-Sunderhof, 13.-17. Mai 2015; Nuncius Hamburgensis - Band 36, Hamburg: tredition 2017

[1] Bulirsch 2013, [8]

As a referee for a journal, this author saw several manuscripts containing larger sections which were obviously copied word by word from other work - sometimes accompanied by stupid errors which showed that there was no deeper understanding of the topic treated. It was easy to reject these manuscripts by citing the original sources.

What, however, can we do if some referee did not notice a plagiarism, and we find that our own scientific results were copied –in content or even word by word – by some other author, and this other author gets the credit for it?

In one of his articles, *Rudolf Gorenflo (* 1930)* wrote in 2011:

> Wir beginnen mit fraktionaler Integration für $x \geq 0$ indem wir für $\alpha \geq 0$ Integraloperatoren $J^\alpha$ einführen. Wir gehen elementar vor, indem wir alle auftretenden Funktionen erforderlichenfalles als genügend gutartig voraussetzen, so, dass die Operatoren, die wir ausführen, erlaubt sind.
> [[[ **Persönliche Zwischenbemerkung:** In einer im Jahre 1994 erschienenen Arbeit habe ich das so gesagt: "We do not bother to give precise descriptions of admissible functions in our theorems but rather prefer a leisurely semi-rigorous style. The reader may assume all occurring data functions $f(t)$ as being continuous for $t > 0$ with a finite or infinite limit as $t \to 0$, but sufficiently well behaved near 0, so that all integrals exist at least in the improper Riemann sense and are finite." Später habe ich diese Sätze in Arbeiten verschiedener Physiker wörtlich wieder gefunden, aber ich wurde nicht als Urheber genannt. Hierzu kann ich nur ein ebenfalls von mir erfundenes Motto zitieren: "I am proud of having ideas worth to be stolen."]]][2]

It should be noted that the 1994 paper he referred to was co-authored[3] – thus Rutman is a hidden co-author here.[4] Gorenflo regretted this when he noticed it - this shows how easily such things happen to us.

# 2 An Example from the History of Technology

## 2.1 Innovation of the Graphical User Interface (GUI)

In 1996 PBS (Public Broadcasting Service, USA) presented a television special by R.X. Cringeley about the early history of personal computers: *Triumph of the Nerds: The Rise of Accidental Empires.*[5]; When preparing this television special, Cringeley interviewed the main actors, among them *Steve Jobs (1955 - 2011)*, co-founder of the Apple company in 1976. In this interview, Jobs said among other things:

> ... It comes down to trying to expose yourself to the best things that humans have done and then try to bring those things in to what you're doing. I mean,

[2] Gorenflo 2011, p.10, [23]
[3] Gorenflo, Rutman 1994 [24]
[4] R. Gorenflo 2016, private communication
[5] Cringeley 1996, [14], accessed on 2015-04-29

> Picasso had a saying, he said "Good artists copy, great artists steal". And we have, you know, always been shameless about stealing great ideas ... [6]

Let us look both at the origin of 'Picasso's saying' and at the process of innovation which Steve Jobs commented on with these words.

*Picasso's saying:* If we google "Good artists copy, great artists steal." we find many entries today. In January 2012, however, there were nearly no entries. It is obvious that Steve Jobs' words triggered most of these entries; many of them cite him. The most complete list of similar sayings, in chronological order and with their sources, seem to be given by The Quote Investigator[7]. The list given there includes names like T.S. Eliot, William Faulkner, Pablo Picasso and Igor Stravinsky – but not a single scientist.

*The innovation of the graphical user interface:* In 1971 Xerox, the company producing copying machines, had the vision of a paperless office dominated by computer screens, and they did not want to go out of business – thus they founded a computer science lab in Palo Alto, close to Stanford University. It was called the Xerox Palo Alto Research Center, Xerox PARC. The staff were around 50 people, and it was said that they were more than 50% of the top computer researchers. Their director gave them unlimited resources and protected them from commercial pressures. They built the Xerox/Alto computer around 1973, revolutionary at the time, but never offered for sale.[8]

> Some people would argue that this [was] the first personal computer. ... it [had] all the elements of quite a modern personal computer and without it we wouldn't have the Macintosh, we wouldn't have Windows we wouldn't have most of the things we value in computing today and ironically none of those things has a Xerox name on it. ... It had the first GUI using a mouse to point to information on the screen. It was linked to other PCs, by a system called ethernet, the first computer network. And what you saw on the screen was precisely what you got on your laser printer. It was way ahead of its time. ... Those early PARC researchers were truly inventing the future. ... But the brilliant researchers at PARC could never persuade the Xerox management that their vision was accurate. Head Office in New York ignored the revolutionary technologies they owned three thousand miles away. They just didn't get it. ... So there was a tremendous mismatch between the management and what the researchers were doing and these guys had never fantasised about what the future of the office was going to be and when it was presented to them they had no mechanisms for turning those ideas into real live products and that was really the frustrating part of it ... [9]

[6] Steve Jobs in part 3 of the transcript, Cringeley 1996, [14]. The full interview Cringeley - Jobs (1995) lasted 67 min, broadcasted were 10 min of it (1996). The tape with the full interview was lost in 1996 and found in 2011, around the time of Jobs' death. It was called *The Lost Interview* and shown at movie houses in 2011 - 2012, and it was made available on a DVD in 2012.

[7] G. O'Toole, version 2013/03/06, [45]

[8] Cringeley 1996, part 3, [14]

[9] several speakers in: Cringeley 1996, part 3, [14]

Apple Computers had been founded in 1976 and was an extremely successful company. In December 1979 its co-founder Steve Jobs got a "previledged invitation" for a visit at PARC and was shown around. He remembered in 1995: they showed him three ground-breaking new inventions: object-oriented programming, Ethernet (i.e. a network of more than one hundred Alto computers which could exchange data, emails, etc, and Alto's Graphical User Interface (GUI) with a mouse. He was "blinded" by the GUI, immediately convinced that all computers must have a GUI in the future.

After the visit, he demanded a second, much more detailed demonstration of the Small Talk System (i.e. the GUI) by *Adele Goldberg (*1945)* for his entire programming team. Adele Goldberg told the Xerox executives that she would not do that.

> I had a big argument with these Xerox executives telling them that they were about to give away the kitchen sink and I said that I would only do it if I were ordered to do it.[10]

She was ordered to do it, and the Apple people understood the essential ideas behind what they saw. It took them about five very difficult years with ups and downs to develop the GUI of the Macintosh and a mechanically stable mouse. The first affordable, market-ready computer with GUI and mouse was the Macintosh, sold in 1984. Also Ethernet and many other inventions were given away by Xerox: many inventors in the research team left Xerox PARC and made a lot of money by exploiting their own ideas.

> Basically [the Xerox executives] were copier heads that just had no clue about a computer or what it could do. And so they just grabbed eh grabbed defeat from the greatest victory in the computer industry. Xerox could have owned the entire computer industry today.[11]

Nevertheless, other people see that Xerox PARC was a big success for Xerox: they got rid of those computer things they did not understand, but they finally got convinced to combine the laser printer with one of their older copying machines, and these remodeled copying machines sold extremely well.[12]

## 2.2 Successful Innovations

Though the foregoing story is extreme and unusual, it also has features which are typical in the history of technology and economy. Having a great idea and a new invention (including a prototype, like the Alto's GUI with a mouse) is not enough: a process of innovation (additional research and development) leading to an affordable, marketable product has to follow. This process of innovation typically requires other abilities and skills than the process of invention.

> You know, [the Xerox mouse] is a mouse that cost three hundred dollars to build and it breaks within two weeks. Here's your design spec: Our mouse needs to be manufacturable for less than fifteen bucks. It needs to not fail

[10] Adele Goldberg in: Cringeley 1996, part 3, [14]
[11] Steve Jobs in: Cringeley 1996, part 3, [14]
[12] Gladwell 2011, [22]

> for a couple of years, and I want to be able to use it on Formica and my bluejeans.[13]

While Steve Jobs always hired new people when he understood that the next necessary step could not be mastered by the staff of his company, the Xerox executives did not hire new people. Instead, they gave the accumulated knowledge away, but not for free: Steve Jobs' "privileged invitation" was bought. To a fair price? That is another question.

> Apple was already one of the hottest tech firms in the country. Everyone in the Valley wanted a piece of it. So Jobs proposed a deal: he would allow Xerox to buy a hundred thousand shares of his company for a million dollars – its highly anticipated I.P.O. was just a year away – if PARC would "open its kimono." A lot of haggling ensued. Jobs was the fox, after all, and PARC was the henhouse. What would he be allowed to see? What wouldn't he be allowed to see? Some at PARC thought that the whole idea was lunacy, but, in the end, Xerox went ahead with it.[14]

According to publications in the theory of economy and the history of technology[15], successful innovations are typically combinations of several, mostly known technologies, general enough to offer big advantages to many potential users. Creative imitators are often more successful in the market than the technical pioneers.

This is in contrast to the popular view on science and technology: the romantic ideal of an artist is more attractive to the public than a highly entangled historical process involving many actors. Thus the public prefers single heroic inventors like James Watt (steam engine), Carl Benz (motor-car), etc.. Also, popular views on inventors are often nationally biased (Wengenroth: "sie schmeicheln Sprachgruppen"): the inventor of the telephone was Phillip Reis (D), Innocenzo Manzetti (I), or Alexander Bell (USA), depending on who is talking.[16]

# 3 Mathematics - First Results and Development

Also in mathematics there are many examples of first versions of an idea or a result (a conjecture, a theorem, an algorithm or ...) and later generalizations or improvements. Who gets the honor? After whom is it named? The first? The last? The most famous? The one who has contributed the most?

In this section we'll look at a few examples: there seems to be no general rule. The group dynamics among mathematicians sometimes led to surprizing results.

We will not discuss here historical differences of names in dependance on scientific discipline or country. About 50 years ago, there were still many examples of mathematical subjects with several names - not only in different countries, but also in different

[13] Steve Jobs to Dean Hovey, in: Gladwell 2011, [22]

[14] Gladwell 2011, [22]

[15] Schumpeter 1912, [52]; Wengenroth 2015, [55]; de.wikipedia, accessed on 2015-10-20, keyword Innovation, [57]

[16] Wengenroth 2015, [55]

scientific disciplines applying mathematics. Nowadays most of these aliases have disappeared - due to international and interdisciplinary cooperation and the facilitation of contacts, electronically and in person. Also, many mathematical textbooks are internationally widely-used and thus led to a unification of the nomenclature.

We will also not discuss here the round trip of an algorithm which changed its name when used in different mathematical applications – this case will be treated elsewhere.

## 3.1 Gaussian Elimination

Gaussian elimination with (partial) pivoting is universally known as *the* method for solving systems of linear equations whenever iterative methods for solving the system are not adequate. Many persons before and after *Carl Friedrich Gauss (1777-1855)* have contributed to the development of the algorithm, including *Isaac Newton(1643-1727)*, *Leonhard Euler (1707-1783)*, *Sylvestre Lacroix (1765-1843)* who introduced the term 'élimination', *André-Louis Cholesky (1875-1918)*, and many others, and, not to forget, also Gauss himself. Joseph F. Grcar described the development of the method in several papers and talks and reviewed his findings in a final paper.[17] Among other things, he wrote

> As Leonhard Euler remarked, it [i.e. Gaussian elimination] is the most natural way of proceeding ("der natürlichste Weg"). Because Gaussian elimination solves linear problems directly, it is an important technique in computational science and engineering, through which it makes continuing, albeit indirect, contributions to advancing knowledge and to human welfare. What is *natural* depends on the context, so the algorithm has changed many times with the problems to be solved and with computing technology. [...] Gaussian elimination is living mathematics. It has mutated successfully for the last two hundred years to meet changing social needs. [...]
>
> The sole development in ancient times was in China. An independent origin in modern Europe has had three phases. First came the schoolbook lesson, beginning with Isaac Newton. Next were methods for professional hand computers, which began with Gauss, who apparently was inspired by work of Joseph-Louis Lagrange. Last was the interpretation in matrix algebra by several authors, including John von Neumann. There may be no other subject that has been molded by so many renowned mathematicians.[18]

On the first day of 1801, the Italian astronomer *Giuseppe Piazzi (1746-1826)* discovered the dwarf planet *Ceres*. He observed it for 40 days, and then it disappeared behind the sun. Many astronomers tried to locate it when it was due to reappear, but they could not find it because they assumed that it was moving on a circle. Gauss used more advanced methods for computing an orbit. Because the data of 40 days was available, he applied his method of least squares to the available data. Ceres was found at the end of 1801 where Gauss had predicted it: the 24 year old Gauss became an international celebrity.

[17] Grcar 2011, [26], see also `https://www.siam.org/visiting/speakers/grcar.php`

[18] Grcar 2011, p. 782, [26]

He published his version of how to compute the orbits of celestial bodies in 1809, four years later than Legendre had published his version of the least squares method. This led to a priority dispute which we will not discuss here. Application of the least squares method to an overdetermined system of linear equations leads to the "equations of the minimum" (Legendre), i.e. the "normal equations" (Gauss). These can be solved, both agreed, by "common elimination", called "schoolbook elimination" by Grcar. But because of the importance of the least squares method to applications in astronomy and elsewhere, it was highly appreciated when Gauss published in 1810 the notations he used and how he performed the solution of the normal equations: this allowed a more efficient organization of the computations and saved about half of the work necessary in schoolbook elimination.

In the following years, cartography became important for economy and military. Gauss devised in 1826 a method how to solve the underdetermined linear systems of geodesy by the least squares method. *Friedrich Bessel (1784-1846)* popularized Gauss' approach, and cartographic bureaus adopted it. Gauss's calculations became part of the mathematics curriculum for geodesists.[19]

So clearly Gauss made an important contribution to Gaussian elimination, but he was not the only one. Why did he get all the credit? Grcar wrote:

> The invention of electronic computers created a discipline that was at first populated by those who made scientific calculations [...]. Among them, George Forsythe [...] was a visionary mathematician who is reputed to have named "computer science" [...]. Gauss's involvement lent credence to the subject matter of the new discipline. The terminology that geodesists had used to describe the calculations of Gauss suggested an origin for what then was named simply "elimination". In an address to the American Mathematical Society, Forsythe [1953[20]] misattributed "high school" elimination to Gauss and appears to have been the first to call it "Gaussian elimination" [...]. The name was widely used within a decade.[21]

## 3.2 Hopf Bifurcation

Before we consider Hopf bifurcation in some detail, we will look at Eberhard Hopf's vita. Also, we will discuss cases in which the mathematical subjects were *not* named after Hopf, for two completely different reasons.

In 2002, Morawetz, Serrin and Sinai edited *Selected works of Eberhard Hopf with Commentaries*. In the Foreword Cathleen Morawetz wrote:

> Hopf (1902-1983) was a founding father of ergodic theory and produced many beautiful and now classical results in integral equations and partial differential equations. In fact so basic, for example, is his maximum principle that it is often used without reference to its author. Born in Austria,

[19] de.wikipedia, accessed on 2015-12-11, keyword 'Methode der kleinsten Quadrate', [57]; Grcar 2011, pp. 785-786, [26]

[20] Forsythe 1953, [19]

[21] Grcar 2011, p. 789, [26]

> trained in Germany, Hopf spent several years at the Harvard Observatory and at M.I.T., returned for a permanent professorship in Leipzig in 1936 (to both dismay and understanding in the mathematical community), moved to Munich in 1944 and was a visiting professor at New York University in 1947. The remainder of his professional life he was a professor at Indiana University.
>
> Hopf was not a prolific writer but a very large fraction of his work remains at the core of the fields he worked in and he wrote with such elegance and clarity that they are of great use today. [...] One notes for example that the paper on Burger's equation has been cited 539 times according to the "Web of Science", but there are hardly any references to his very well-known and useful bifurcation results. However, the phrase "Wiener-Hopf" appears in 645 titles in the A.M.S. Math Reviews.[22]

The maximum principle for harmonic functions, the Laplace equation and some other equations has been known for a long time, starting with Riemann's dissertation in 1851 (advisor Gauss). It was then reformulated and generalized by many authors. The name 'maximum principle' was already well established before Hopf's remarkable results. Hopf proved strong maximum principles for general second-order elliptic operators in 1927. This opened the way to many additional important applications.[23]

There is no need, however, to identify a maximum principle by an additional name: which version is needed depends on the equations treated and on the intended results.[24] For bifurcations this is very different: the same parameter-dependent system may have many different types of bifurcations, depending on the parameter domain considered: pitchfork bifurcation, Hopf bifurcation, period-doubling bifurcation, symmetry-breaking bifurcation, etc.[25] The work of Hopf with respect to bifurcation is brought to mind by the name 'Hopf bifurcation'. That Hopf's paper does not have a record in the "Web of Science" (WoS) is due to the fact that it appeared in the proceedings of the Saxon academy of sciences. This journal is not in the core collection of WoS and not easily accessed.[26]

In the preface to their book *The Hopf Bifurcation and Its Applications* Marsden and McCracken wrote:

> Historically, the subject had its origins in the works of Poincaré [...] around 1892 and was extensively discussed by Andronov and Witt [...] and their co-workers starting around 1930. Hopf's basic paper [...] appeared in 1942. Although the term "Poincaré-Andronov-Hopf bifurcation" is more accurate (sometimes Friedrichs is also included), the name "Hopf Bifurcation" seems more common, so we have used it. Hopf's crucial contribution was the

[22] Morawetz, Serrin, Sinai 2002, Foreword, [42]
[23] Protter, Weinberger 1984, p. vi; Bibliographical Notes, pp. 156-158, [46]
[24] Lortz, Meyer-Spasche 1982, [32]
[25] Meyer-Spasche 1999, [39]
[26] Hopf 1942, [29]

extension from two dimensions to higher dimensions.[27]

Thus Marsden, McCracken reinforced the use of the concise name "Hopf bifurcation" because it already was more common than the very lengthy name "Poincaré-Andronov-Hopf(-Friedrichs) bifurcation". This longer name also would not be perfectly accurate: there are further contributions to the subject by other authors – also contributions in the book of Marsden, McCracken: it has 25 sections; 15 were written by Marsden and McCracken and 10 were written by 15 other authors, see the list of additional authors on the inner front page and in the table of contents. The book by Marsden, McCracken is thus another example for section 6, 'Authors - Editors', but is not listed there.

Hopf himself was very aware of the work of Poincaré, but maybe not of the publications of Andronov et al before 1942 (The list of references in Marsden, McCracken contains two short papers (1930, 3 pages; 1937, 5 pages) and a book on oscillations in Russian (1937)). In his paper of 1942, Hopf discussed the connections of his results with the work of other authors, especially Poincaré:

> In the literature, I have not come across the bifurcation problem considered on the basis of the hypothesis (1.2) [ $\alpha(0) = -\bar{\alpha}(0) \neq 0, \quad \mathrm{Re}(\alpha'(0)) \neq 0$]. However, I scarcely think that there is anything essentially new in the above theorem. The methods have been developed by Poincaré perhaps 50 years ago[0] and belong today to the classical conceptual structure of the theory of periodic solutions in the small. Since, however, the theorem is of interest in non-conservative mechanics it seems to me that a thorough presentation is not without value. In order to facilitate the extension to systems with infinitely many degrees of freedom, for example the fundamental equations of motion of a viscous fluid, I have given preference to the more general methods of linear algebra rather than special techniques (e.g. choice of a special coordinate system).[28]

That some other results of Hopf do not carry his name is related to his return to Germany in 1936:

> Hopf was never forgiven by many people for his moving to Germany in 1936, where the Nazi party was already in power. As a result most of his work on ergodic theory and topology was neglected or even attributed to others in the years following the end of World War II. An example of this was the dropping of Hopf's name from the discrete version of the so-called Wiener-Hopf equations which are currently referred to as "Wiener filter".[29]

[27] Marsden, McCracken 1976 pp.vii-viii, [33]

[0] Les méthodes nouvelles de la mécanique céleste. The above periodic solutions represent the simplest limiting case of Poincaré's periodic solutions of the second type [...]. Poincaré, having applications to celestial mechanics in mind, has only thoroughly investigated these solutions [...] in the case of canonical systems of differential equations, where the situation is more difficult than above. [...] which thereby becomes simpler. [...]

[28] Hopf 1942, [29], English version by Howard, Kopell in: Marsden, McCracken 1976, p.167f, [33]

[29] O'Connor, Robertson et al in: MacTutor History of Mathematics archive, Hopf Eberhard biography, [44], last visit in Jan 2016

Thus the name 'Hopf bifurcation' is a bit surprizing.

The return of Hopf, *Walter Tollmien (1900-1968)* and others to Germany after May 1933 was discussed by Siegmund-Schultze in detail.[30] When so many scientists lost their jobs because of the Nazis, many positions became available in Germany, but even excellent scientists had problems to find adequate positions abroad.

> It should not be very difficult in the near future for a German with flawless [einwandfrei] grandparents to find an adequate position in Germany. Perhaps one should make Germans abroad aware of this fact – something that would in turn open up chances for us abroad.[31]

There were several attempts to offer chairs to Eberhard Hopf: one in Bonn, one in Göttingen, and the one of v.Mises in Berlin. They failed because of the resistance of the 'Dozentenschaft' (the Nazi faculty organization). 'There were accusations that he was friends with an alleged communist during his university studies.' If he could be convinced to move to Bonn 'he could probably be more courageous than others because he would always have the chance to go back to America.'[32]

When Hopf got the offer of the chair in Leipzig, he had a permanent position at MIT, not very well payed. He did not accept the offer for Leipzig spontaneously, but quite fast, too fast for his enemies among the Nazis. He consulted with a number of German refugees and he tried unsuccessfully to improve his position at MIT. Then he accepted the offer, delighted by the prestigious position and the very good payment.[33]

Schlote investigated the interactions of mathematics and physics at Leipzig university during the years 1905-1945. This includes the years when Hopf was there.[34] On August 4, 1936 it was decided in Berlin to send an offer to Hopf. Two detailed letters were sent to him, one by the dean *Paul Koebe (1882-1945)* and one by the ministry. After a short exchange about financial matters, Hopf cabled his agreement, only three weeks after the first letter was sent to him. A few days later, Hopf was denunciated as being friendly with Jews - everything became uncertain again. Since the 'Stellvertreter des Führers' (representative of Hitler) had agreed to the offer, it could not be withdrawn, they had to find another way to resolve the problem. From october 1936 until summer 1937, Hopf was only the administrator of the chair. Positive reviews were written about him regarding his political, professional and personal qualities, and then he became full professor. He stayed at Leipzig university until march 1942, when he was given leave of absence and was sent by the ministry to an aerodynamic research institution in Ainring (Bavaria), too far away from Leipzig for commuting. His work (important for the war) in Ainring was probably the motif for his move from Leipzig university to Munich university in 1944.

Was Hopf a Nazi? *Norbert Wiener (1894-1964)* remembered:

[30] Siegmund-Schultze 2009, chapter 7, especially sections 7.S.2 and 7.S.3, [54]

[31] letter in May 1935 from *Kurt Hohenemser (1906-2001)* to von Kármán in: Siegmund-Schultze 2009, section 7.S.2, [54]

[32] letter from Alfred Brauer (Berlin) to Otto Toeplitz (Bonn) in May 1935, in: Siegmund-Schultze 2009, section 7.S.3, [54]

[33] Wiener 1956, [56], Siegmund-Schultze 2009, sec. 7.S.3, [54]

[34] Schlote 2008, pp. 250ff, [51]

> Originally he was hostile to Hitler, or at least sympathetic to those on whom Hitler had wreaked his ill will. However, there were strong family influences pulling him to the Nazi side.[35]

And in Leipzig? Nothing is known from his time in Leipzig (1936-1942) which would prove that he was an active Nazi - on the contrary: Hopf was among those who tried to help *Ernst Hölder (1901-1990)* when Hölder was denied an adequate position because his two sisters were married to Jewish mathematicians. Also, Hopf and *B.L. van der Waerden (1903-1996)* had many disagreements with Koebe who was much closer to the regime and who tried to impose the 'Führerprinzip' - leadership by one person (Koebe) instead of the more democratic joint administration by all three full professors.[36] Hopf's reference to Poincaré's work in his bifurcation paper shows very clearly that he ignored the silly theory of Bieberbach et al about 'German Mathematics' and 'French Mathematics'.

## 3.3 Zorn's Lemma

Zorn's Lemma or the Kuratowski-Zorn Lemma is a result in the theory of sets. It states that a partially ordered set satisfying certain assumptions always contains a maximal element. Thus Zorn himself called it a *Maximal Principle*. This maximal principle is equivalent to the well-ordering theorem and the axiom of choice.

Zorn was not the first who formulated such a maximal principle, and he was not the last. Actually, there are so many closely related maximal principles by so many mathematicians, that historians investigating the development during the years 1953-1978 grouped them together into eight maximal principles, M1-M2, M3-M4, M5-M6, M7-M8. A sketch of which author formulated which type of maximal principle in which year is shown in Figure 1 of the paper by Campbell[37], repeated here as Figure 1.

Triggered by a letter to the editor and a following discussion in the *Notices of the American Mathematical Society* in 1976, Paul J. Campbell wrote a paper about the questions: *Why Zorn?* and *Why Lemma?*. He reviewed most of the previous results of historians about these questions and he had several phone calls with *Max Zorn (1906-1993)* (who stressed that he was not sure if he remembered correctly), and he contacted also Chevalley, Tukey and Kuratowski.

Zorn found his maximal principle in 1933 in Hamburg and discussed it with his former Ph.D. advisor *Emil Artin (1898-1962)* and with Artin's guest *Claude Chevalley (1909-1984)*, one of the first generation Bourbakis. Zorn emigrated to Yale in August 1934. It seems that Zorn was the first who stated the equivalence of his maximal principle with the axiom of choice and the well-ordering theorem. He announced a proof in his paper of 1935.[38] Also, he was the first who applied the maximal principle to a problem in algebra.

[35] Wiener 1956, [56]; Siegmund-Schultze 2009, sec. 7.S.3, [54]
[36] Schlote 2008, pp. 250-261, [51]
[37] Campbell 1978, [9]
[38] Zorn 1935, [59]

> How the term "Zorn's Lemma" came to be is still something of a mystery, [...] Thus, there seems no doubt that Zorn provided a great service in directing attention to the largely unrealized potential in maximal principles.[39]

Bourbaki talked about 'le théorème de Zorn', Tukey probably was the first who used the words 'Zorn's Lemma', and both did not refer to M3, but to other versions. Campbell's conclusion:

> The history of mathematics is rife with a variety of misattributions, whose continued propagation by oral and written tradition is variously due to widespread ignorance of the historical facts, accepted convention, or just plain complication of the situation. All of these play their part in "Zorn's Lemma"; even the term is used by different people to denote different propositions, logically – but not historically – equivalent.
>
> This paper does not offer an authoritative version of the history of the interrelations of the tribe of maximal principles that pass for "Zorn's Lemma". The families of principles whose genealogies are discussed here have multiplied further, with contributions from [...] [40]

# 4 Author Phantoms

Pseudonyms of single persons are so common that we will not treat them here. Special examples are treated in section 5, 'Magic Caps'.

## 4.1 N. Bourbaki and A.U. Team

The best known author phantom is probably **N. Bourbaki**, also written as *Nicolas Bourbaki* or *Nicholas Bourbaki*, located at Nancago (Nancy/Chicago). It is well-known that Bourbaki is a group author. But who are the current members of the group is always kept secret to the public and only revealed in retrospect. They like to stay in the dark while active and to play with the identity of Nicolas Bourbaki. They even pretended to be a single person:

> This work gathers together [...] the majority of the historical Notes which have appeared to date in my *Eléments de Mathématique.*[41]

and protested heavily when somebody wrote that they are a group. There is plenty of literature about Bourbaki.[42] Since Bourbaki-members have to retire from the group at age of 50, there are quite a number of articles by ex-Bourbaki-members which they published after retirement.

[39] Campbell 1978, p.82-83, [9]

[40] Campbell 1978, p.85, [9]

[41] Nicolas Bourbaki 1984, English edition 1994, Preface, [6]

[42] e.g. Henri Cartan 1959, [10]; Armand Borel 1998, [4], Maurice Mashaal, [35], and the references therein.

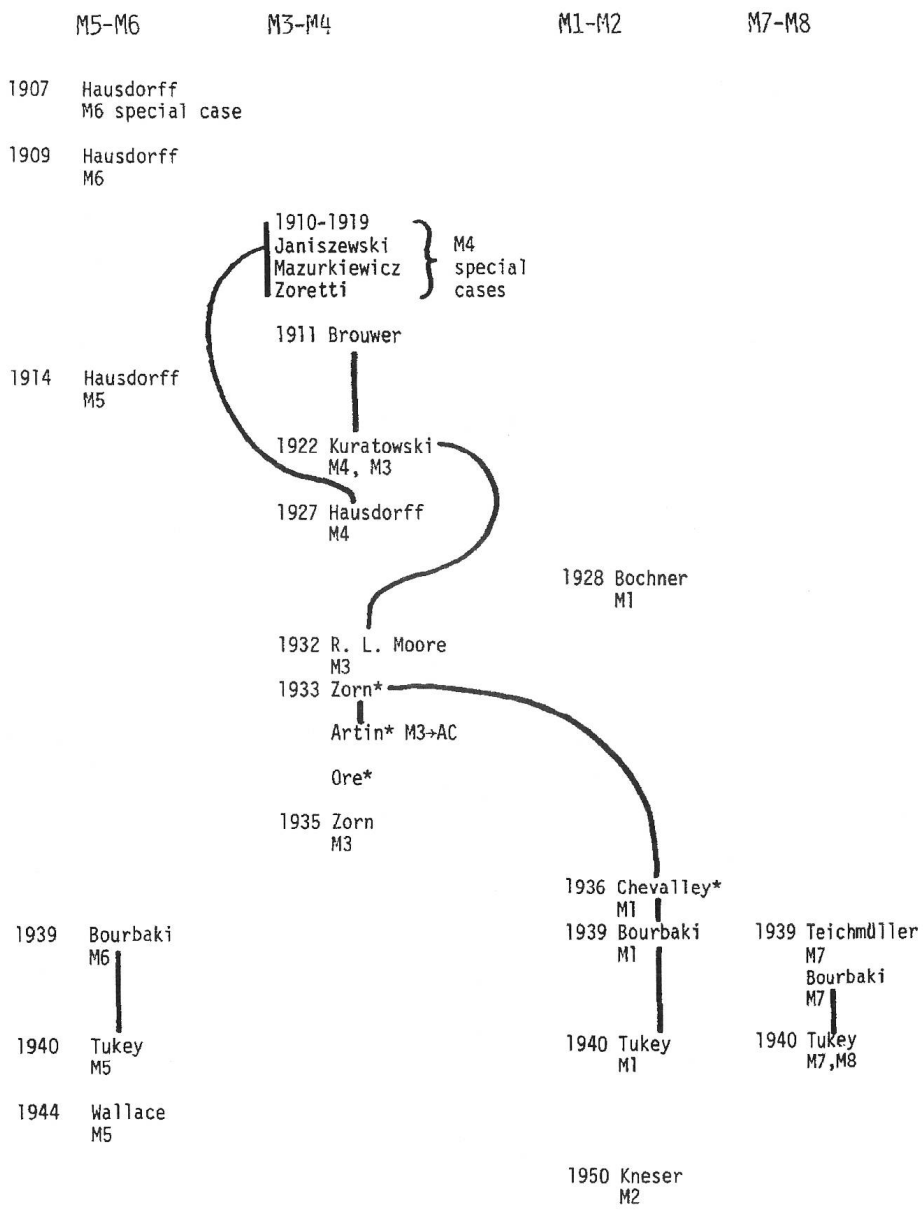



FIGURE 1
Family tree of "Zorn's Lemma." * indicates information supplied by Zorn.
Solid lines indicate known associations.

Figure 1: Family tree of "Zorn's Lemma"; '*' indicates: supplied by Max Zorn. Solid lines indicate known associations. `Campbell 1978, Figure 1, [9]`

In 1934, Henri Cartan and André Weil were teaching calculus at the university of Strasbourg and were quite unhappy about the outdated standard French textbook by *E. Goursat (1858-1936).*

> In the early thirties the situation of mathematics in France at the university and research levels [...] was highly unsatisfactory. World War I had essentially wiped out one generation. The upcoming young mathematicians had to rely for guidance on the previous one, [...]. Little information was available about current developments abroad, in particular about the flourishing German school (Göttingen, Hamburg, Berlin), as some young French mathematicians (J. Herbrand, C. Chevalley, A. Weil, J. Leray) were discovering during visits to those centers.[43]

So Cartan and Weil decided to write a new textbook. Soon they found out that this was a bigger challenge than they had first thought, and that one book would not be enough. When other colleagues and friends from the École Normale Supérieure heard about their project, they joined in. Soon the group consisted of eight to twelve persons. They all were very unhappy that mathematics was falling apart into many different fields for specialists, sometimes with several names for the same mathematical object, sometimes with one name for several different mathematical objects. Thus they decided to unify mathematics and to choose the axiomatic method of presentation.[44] They agreed that several versions of every text should be written, by different members and preferably by non-specialists of that field. A text was not final before each member of the group had agreed to it. Thus they felt that it was adequate to present their results under one single name.[45] The pen name N. Bourbaki was chosen by André Weil in the summer of 1935, when he introduced their newly created personality to the scientific world by submitting their first paper. Since Weil was convinced that the name 'Bourbaki' was of Russian origin, he agreed to call him 'Nicolas'.[46] It is not surprizing that a group cooperating that closely was not stable from the very beginning.

> The membership varied over the years; some people in the first group dropped out quickly, others were added, and later there was a regular process of additions and retirements.[47]

The main persons of the founding generation were *Henri Cartan (1904-2008)*, *Claude Chevalley (1909-1984)*, *Jean Delsarte (1903-1968)*, *Jean Dieudonné (1906-1992)* and *André Weil (1906-1998).* A member of the following generation (from 1953-1973) was *Armand Borel (1923-2003).* He became associated to the group in 1949.[48]

*Why did they choose the name Nicolas Bourbaki?*

[43] Armand Borel 1998, [4]

[44] Note that they chose the title *Eléments de Mathématique*: 'Eléments' reminding of Euclid's work; 'Mathématique', not 'Mathématiques'

[45] Henri Cartan 1959, [10]

[46] Maurice Mashaal 2006, pp. 22-37, [35]

[47] Armand Borel 1998, p.2, [4]

[48] Armand Borel 1998, p.2, [4]

Cartan did not address this question in his talk[49]. On the contrary, he gave a lot of details about the Turkish-Greek origin of the name 'Bourbaki' and about real and fictitious members of a large family with members on Crete, in France and in Poldavia, mixing up the history of the family of the really existing French person General Charles Bourbaki and the family of Nicolas, and he stressed that Nicolas is a relative of the general: "Die Sage will, daß im siebzehnten Jahrhundert ..."[50] Two Greek brothers on Crete were fighting so strongly against Turkish invaders that the Turkish called them *Vourbachi* (i.e. Schlägerführer[51], he who strikes first[52]), which became Bourbaki in Greek (v to $\beta$, ch to $\chi$). During Napoleon's Egyptian campaign, a member of the Bourbaki family helped Napoleon, and Napoleon granted stipends in France to three of his sons. Nicolas is a relative of them, member of the Royal Academy of Poldavia (Cartan: Poldawien). 'La Poldévie (ou Poldavie chez certains continuateurs) est un pays imaginaire'.[53] La Poldévie played a role in French politics in 1929.
Armand Borel[54] referred to the thesis of Liliane Beaulieu of 1989.
From the detailed discussion by Mashaal[55] based on both the theses of 1977 by Judith Friedman and of 1989 by Liliane Beaulieu and on interviews with several ex-members, it becomes clear that only André Weil could answer the question. Mashaal cites an undated text ('probably from around 1960') by the Bourbakis about the history of the Bourbaki families. Many details differ from those of Cartan's version, of course. Poldavia got replaced by cities in eastern Europe: Nicolas now studied in Kharkow and became professor in Dorpat (Dorpat is called Tartu since 1918).

The famous French general *Charles-Denis Sauter Bourbaki (1816-1897)* was a son of the Greek immigrant Constantin Denis Bourbaki (1787 - 1827). He was very successful in many battles, but towards the end of the French-German war of 1870/71, he failed and was driven by the German forces towards the Swiss border. Not to become German prisoners of war, his army (about 87 thousand out of originally 150 thousand soldiers) surrendered at the Swiss border, entered Switzerland in a pitiful condition and were taken care of by the local Swiss people and by the Red Cross (founded in 1863). When they had recovered and the war had ended, they returned to France. This is commemorated with a panorama picture in a museum in Lucerne.[56]

> Nicolas has pledged to produce a comprehensive treatise of modern mathematics; the staggering scope of his enterprise makes plain his kinship to Captain Mauger's omnivorous pet [a hedgehog with name Bourbaki in a novel first published in 1900]. The soul of Nicolas's enterprise lies in bringing together the apparently diverse realms of mathematics and demonstrating their underlying unity; General Bourbaki, yearning to reunite his scattered army, would have understood. [...] (General topology, general algebra,

[49] Henry Cartan 1959, [10]
[50] "According to the legend, in the 17th century ..."
[51] Henri Cartan, p.2, [10]
[52] Maurice Mashaal 2006, p.30, [35]
[53] fr.wikipedia, accessed on 2015-12-10, keyword Poldavie, [57]
[54] A. Borel 1998, [4]
[55] Maurice Mashaal 2006, pp. 22-37, [35]
[56] `http://www.bourbakipanorama.ch`

general this, general that - might as well be written by a general!)[57]

Not so often seen is the phantom author **A.U. Team**: this person got listed as co-author when a person not familiar with the physics experiment ASDEX Upgrade 'corrected' a list of co-authors by abbreviating *ASDEX Upgrade Team*. It is standard at Max-Planck-Institute for Plasma Physics that every paper using experimental results of ASDEX Upgrade adds ASDEX Upgrade Team as co-author. This is a group author identifying the team running the experiment (ca 350 persons)[58]

## 4.2 Binomi

Though the *Binomial Theorem* is known to mathematically trained people all over the world, its pretended originator *Binomi* seems to be known only in the German-speaking scientific community.[59]

In 1969 the Swiss astronomer *Paul Wild (1925-2014)* gave the name Binomi to the newly discovered asteroid 2029. During the years 1961-1994, Wild discovered and named numerous comets, asteroids and supernovae. Some of the 94 asteroids which he discovered he called (2001) Einstein, (2029) Binomi, (2034) Bernoulli, (1768) Appenzella, (1773) Rumpelstilz, (1775) Zimmerwald, (1935) Lucerna, (2521) Heidi, (1860) Barbarossa, (1866) Sisyphus, (2138) Swissair, (2152) Hannibal, (2868) Upupa, and also (9302) 1985 $TB_3$ (together with I. Bauersima), (9149) 1977 $TD_1$.[60]

In 1976 *Otto Forster (*1937)* gave more details about Binomi in his textbook *Analysis I* (Calculus 1): he listed *Binomi, Alessandro (1727-1643)* in the index, in reference to the Binomial Theorem.[61] Forster's book is very successful: it was reprinted and revised a number of times. Alessandro Binomi is also listed in the most recent, 11th edition of 2013.

Around 2007, the tale about Binomi entered officially the teaching at schools: Figure 2 shows the upper part of page 87 in an edition of Lambacher-Schweizer[62], a standard mathematics textbook with different editions for schools in all German states. It shows a bust of *Francesco Binomi (1472-1483), discoverer of the binomial formulas*. Since then, rumors about Binomi continued to grow. On a website of a German school, a detailed curriculum vitae and a portrait are given for *Luigi Allesandro Binomi (1484-1543), mathematician in Pisa and Padua and shepherd on Sardinia*.[63] There is also a German

[57] Sterling K. Berberian 1980, [3]

[58] the list of names is given each year in the Annual Report; see, for instance, IPP 2014, p. 205, [36]

[59] de.wikipedia, accesssed on 2015-10-28; keyword 'Binomi': no link to an entry in another language, [57]; Kapitel: Klangvolle Namen - von unechten und echten Mathematikern, In: Zankl 2008, [58]

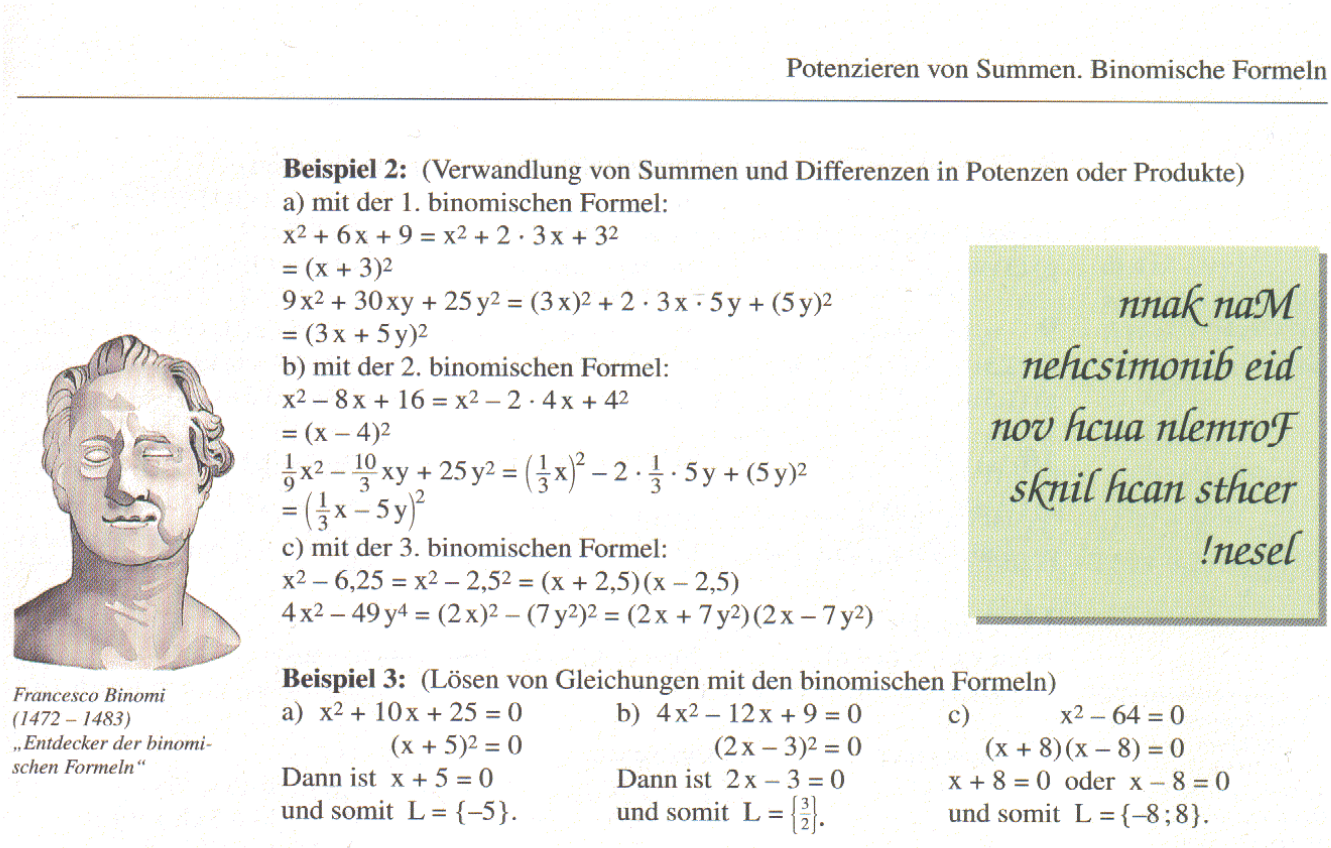
[60] en.wikipedia, accessed on 2015-10-28, keyword 'Paul Wild', [57]; see also the IAU Minor Planet Center, `http://www.minorplanetcenter.net/iau/lists/NumberedMPs000001.html`

[61] Namens- und Sachverzeichnis in: Forster 1976, [18]. Note that the dates of *Sir Isaac Newton* are 1643-1727, in the Gregorian Calendar.

[62] Lambacher Schweizer Lehrwerk Mathematik, [30]; Many thanks to Ulrich Reich for telling me about this and for providing a copy of page 87 to me.

[63] `http://www.rhein-wied-gymnasium.de/binomis_welt/mathematiker/binomi.html`, accessed on 2015-11-10

publishing company *Binomi Verlag*, publishing mathematics books for students.



Potenzieren von Summen. Binomische Formeln

**Beispiel 2:** (Verwandlung von Summen und Differenzen in Potenzen oder Produkte)
a) mit der 1. binomischen Formel:
$x^2 + 6x + 9 = x^2 + 2 \cdot 3x + 3^2$
$= (x + 3)^2$
$9x^2 + 30xy + 25y^2 = (3x)^2 + 2 \cdot 3x \cdot 5y + (5y)^2$
$= (3x + 5y)^2$
b) mit der 2. binomischen Formel:
$x^2 - 8x + 16 = x^2 - 2 \cdot 4x + 4^2$
$= (x - 4)^2$
$\frac{1}{9}x^2 - \frac{10}{3}xy + 25y^2 = \left(\frac{1}{3}x\right)^2 - 2 \cdot \frac{1}{3} \cdot 5y + (5y)^2$
$= \left(\frac{1}{3}x - 5y\right)^2$
c) mit der 3. binomischen Formel:
$x^2 - 6{,}25 = x^2 - 2{,}5^2 = (x + 2{,}5)(x - 2{,}5)$
$4x^2 - 49y^4 = (2x)^2 - (7y^2)^2 = (2x + 7y^2)(2x - 7y^2)$

*nnak naM*
*nehcsimonib eid*
*nov hcua nlemroF*
*sknil hcan sthcer*
*!nesel*

*Francesco Binomi*
*(1472 – 1483)*
*„Entdecker der binomischen Formeln“*

**Beispiel 3:** (Lösen von Gleichungen mit den binomischen Formeln)

a) $x^2 + 10x + 25 = 0$
$(x + 5)^2 = 0$
Dann ist $x + 5 = 0$
und somit $L = \{-5\}$.

b) $4x^2 - 12x + 9 = 0$
$(2x - 3)^2 = 0$
Dann ist $2x - 3 = 0$
und somit $L = \left\{\frac{3}{2}\right\}$.

c) $x^2 - 64 = 0$
$(x + 8)(x - 8) = 0$
$x + 8 = 0$ oder $x - 8 = 0$
und somit $L = \{-8; 8\}$.

Figure 2: Francesco Binomi according to Lambacher-Schweizer, upper part of page 87, [30]

## 4.3 Julius Eigen

Sometimes young students get confused by the fact that the German words *Eigenwert, Eigenvektor, Eigenfunktion* etc are correctly translated as *eigenvalue, eigenvector, eigenfunction* etc, and in texts by Asian authors sometimes are written as *Eigen Value, Eigen Vector, Eigen Function* etc. Around 2004 we find related questions in several discussion forums. Probably the first one:

> U Woher kommt die Bezeichnung Eigenwert?
> Hallo,
> mich würde mal interessieren, woher der Name Eigenwert/Vektor kommt. Ich dachte immer "Eigen" wäre das entsprechende deutsche Wort, aber im englischen heissen die Dinger Eigenvalues.

Gab es mal einen Herrn Eigen, der das definiert hat?
Jockel[64]

Others added that they searched Google and Wikipedia and did not find anything on a mathematician Eigen. Today, there are many entries on *Julius Eigen*, not to be confused with the Nobel-Prize winner *Manfred Eigen (* 1927)*. The details about Julius Eigen vary: he lived during the years (1827-1904), he died in 2006 at age of 88, he was a student at or a member of the mathematics department at Humboldt-Universität Berlin. One day in 2006 a colleague at Humboldt Universität excused him at the beginning of an important seminar: Julius was unable to attend because he suffered from acute non-existence.[65]

## 4.4 Prof Alois Kabelschacht

*Prof Alois Kabelschacht of Max-Planck-Institut für Physik* should also be mentioned. According to his colleague Breitenlohner[66], the story is the following: In the institute of *Werner Heisenberg (1901-1976)*, the doorplates of the offices showed only the room numbers and the last names of the scientists, not their first names and not their academic titles, with one exception: *Prof. Heisenberg - Anmeldung im Zimmer nebenan.* One of the doorplates read *Kabelschacht* (cable duct). Since visitors did not meet Dr. Kabelschacht, they asked about him. And his colleagues started to mention him in their discussions: 'This is an interesting problem - we should discuss this with our colleague Kabelschacht.' - 'Kabelschacht remarked about this problem: ...' After a while somebody knew his first name: Alois. He became co-author of several papers and is the single author of a paper about TEX-problems in the journal of the TEX-User Group (TUG) (see below). After some time his colleagues decided that Kabelschacht was such an important scientist, he should become professor. Since visiting professors also got a *Prof* on their doorplate, the doorplate was changed to *Prof Kabelschacht.*
An incomplete list of his publications:

1. P. Breitenlohner, A. Kabelschacht (1979): *Auxilliary fields of n=2 extended supergravity in 5 and 6 space-time dimensions*, Nuclear Physics B *148*, 96-106

2. Alois Kabelschacht: `\expandafter` vs. `\let` and `\def` in Conditionals and a Generalization of PLAIN's `\loop`. TUGboat 8, Nr. 2, 1987, p. 184-185

3. M. Bott-Bodenhausen, I. Holl, A. Kabelschacht et al (1992): *A new air Cherenkov counter concept for the observation of extended air showers* Nucl. Instr. Methods in Physics, Research Section A *315*, 236

[64] Themenstart: 2003-01-31 16:51, `http://www.matheplanet.com/`

[65] `http://www.matheplanet.com/`; `https://www.c-plusplus.net/forum/142670-full`; Klangvolle Namen, In: Zankl 2008, [58]; de.wikipedia, accessed on 2015-11-11, keyword 'Wissenschaftlicher Witz', [57]

[66] Breitenlohner 2012, [7]; see also
`https://www.newikis.com/de/wiki/Benutzer:RolteVolte/Alois_Kabelschacht`

4. S. Dittmaier, A. Kabelschacht, T. Kasprzik (2008): *Polarized QED splittings of massive fermions and dipole subtraction for non-collinear-safe observables,* Nuclear Physics B *800*, 146-189

In 2011 Oliver Schlotterer thanked Prof. Kabelschacht in the acknowledgement of his dissertation for paying the cups of coffee he had at the MPI and for sharing his deep insights on conformal field theory with him.
We should also mention that Alois Kabelschacht is an (inactive) facebook member: his portrait photo shows the doorplate.

# 5 Magic Caps - and Unveilings

## 5.1 Hidden Melanchthon

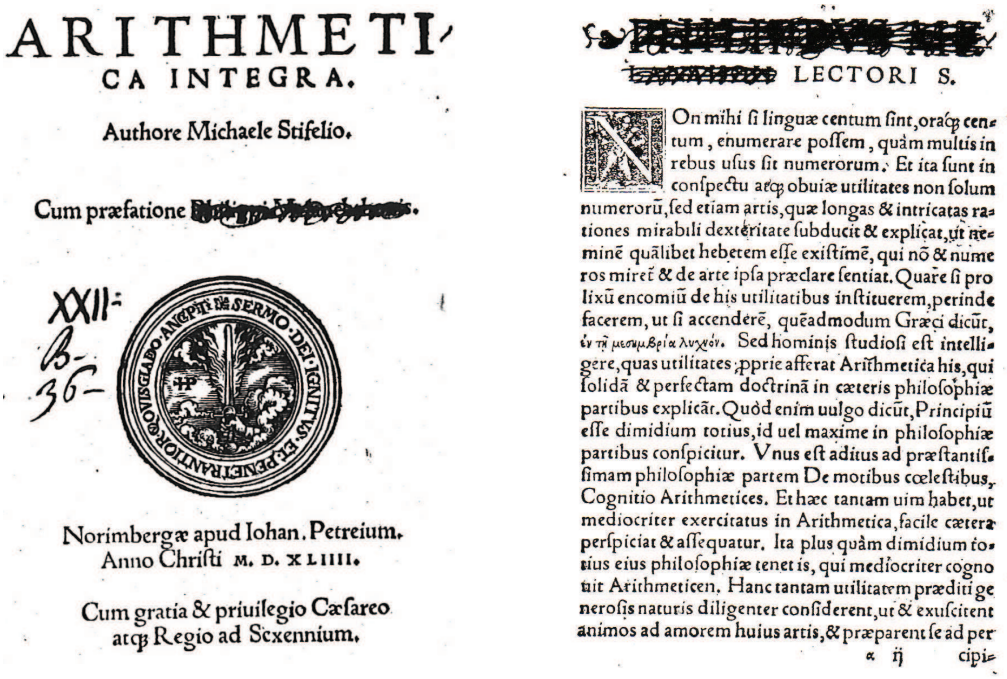
The humanist *Philippus Melanchthon (1497-1560)* attended schools in Bretten and Pforzheim and studied the Trivium at the University of Heidelberg. Only when he studied the Quadrivium at University of Tübingen he learned arithmetic, geometry, astronomy and astrology – and regretted very much that these things were not taught to him much earlier. Later, when he was professor at University of Wittenberg and did a lot of work to reform education at schools and universities, he always stressed that teaching of mathematics is very important. He wrote prefaces to several mathematical textbooks, also to one of the most important mathematical books of the 16th century, Michael Stifel's *Arithmetica Integra*, Nürnberg 1544. One copy of this book belongs to the Bibliotheca Vaticana Roma – but people in the Vatican could not admit that there is a text (praising the importance of arithmetic) in their library which has been written by one of the most important promotors of the Lutherian reformation. So they crossed out the name of Melanchthon on the title page of the book and on the first page of the preface, so that it cannot be read anymore. But the copy in the library of the Vatican is not the only one, so we know what they crossed out[67], see Figure 3.

## 5.2 Female 'Men of Science'

There were several women who assumed a man's identity in order to realize their full potential and to become scientists – and there were women mathematicians who were declared to be no women anymore by some of their colleagues. But there was also often support for these women in those early years.

**Nawojka and Yentl** There is a legendary Polish woman *Nawojka*. She is considered the first female student and teacher in Poland and very popular. There are several different versions of her story. Two cities, for example, are proud that she was born there. All different versions have in common: She is said to have lived in the 14th-15th century and got an education that qualified her for studying at a university. Since this was forbidden for a woman, she dressed as a man and studied for two years at University of Kraków. After she was disclosed as a women, she became a nun and a teacher.

[67] Reich 2015, [47]



ARITHMETI-
CA INTEGRA.

Authore Michaele Stifelio.

Cum præfatione [redacted].

XXII
B
36

Norimbergæ apud Iohan. Petreium.
Anno Christi M. D. XLIIII.

Cum gratia & priuilegio Cæsareo
atq; Regio ad Sexennium.

[redacted] LECTORI S.

NOn mihi si linguæ centum sint, oraq; centum, enumerare possem, quàm multis in rebus usus sit numerorum. Et ita sunt in conspectu atq; obuiæ utilitates non solum numerorũ, sed etiam artis, quæ longas & intricatas rationes mirabili dexteritate subducit & explicat, ut neminẽ quãlibet hebetem esse existimẽ, qui nõ & numeros mireẽ & de arte ipsa præclare sentiat. Quare si prolixũ encomiũ de his utilitatibus instituerem, perinde facerem, ut si accenderẽ, quẽadmodum Græci dicũt, ὐν τῇ μεσημβρίᾳ λυχνόν. Sed hominis studiosi est intelligere, quas utilitates apprie afferat Arithmetica his, qui solidã & perfectam doctrinã in cæteris philosophiæ partibus explicãr. Quòd enim uulgo dicũt, Principiũ esse dimidium totius, id uel maxime in philosophiæ partibus conspicitur. Vnus est aditus ad præstantissimam philosophiæ partem De motibus cœlestibus, Cognitio Arithmetices. Et hæc tantam uim habet, ut mediocriter exercitatus in Arithmetica, facile cætera perspiciat & assequatur. Ita plus quàm dimidium totius eius philosophiæ tenet is, qui mediocriter cognouit Arithmeticen. Hanc tantam utilitatem præditi generosis naturis diligenter considerent, ut & excusitent animos ad amorem huius artis, & præparent se ad per-

α ij cipi-

Figure 3: Michael Stifel, *Arithmetica Integra*, Nürnberg 1544, Melanchthon's name crossed out on the title page and at the beginning of Melanchthon's preface, copy in the Bibliotheca Vaticana Roma; see `Reich 2015, Abb.5, [47]`

The first women were allowed to study at University of Kraków in 1897. The first dormitory for female students was opened in 1936 and named Nawojka (now a student hostel). Also, there is a Nawojka street in Kraków.[68]

The oldest historical document about her was written by *Martin von Leibitz (ca 1400 in Leibitz/L'ubica (SK) - 1464 in Vienna)*: he visited Latin schools in Kraków and Neisse/Nysa (PL) before he started to study in Vienna in 1420. Later he became abbot of a Benedictine convent in Vienna and a very influential person. In the last years of his life he wrote an autobiography ('Senatorium'), ment to educate young monks. In the chapter about his youth (C.2) he told about a disguised female student in Kraków (without a name) in a very positive way. After her disclosure she and the people who knew her were questioned by a judge. She said that she had done it "For the love of learning" and all others questioned about her agreed that she was completely focussed on learning and a very good student, and she would have passed her exam in the near

[68] private communications of Danuta Ciesielska and Zdzislaw Pogoda; Polish, English, Swedish wikipedia articles, accessed on 2016-2-3, keyword 'Nawojka', this spelling!, [57]

future. She herself suggested that she should become a nun, and according to Martin von Leibitz, she became abbess of her convent.[69]

In C.2, Martin von Leibitz wrote also about two other disguised women: *Pope Johanna* and *Jeanne d'Arc (1412-1431)*. It is remarkable that such an influential, contemporary person was so positive about these women.

Is there evidence that she actually existed? This question was discussed in detail by Shank.[70] He also gave an English translation of Martin von Leibitz's Latin text about the Kraków student, but apparently Shank did not look at the text about the other two disguised women - the trigger for Martin's stories could have been Jeanne d'Arc. Though Shank's search in Kraków did not reveal additional documents (in any of the convents), Shank's conclusion was: yes, the female student probably existed.

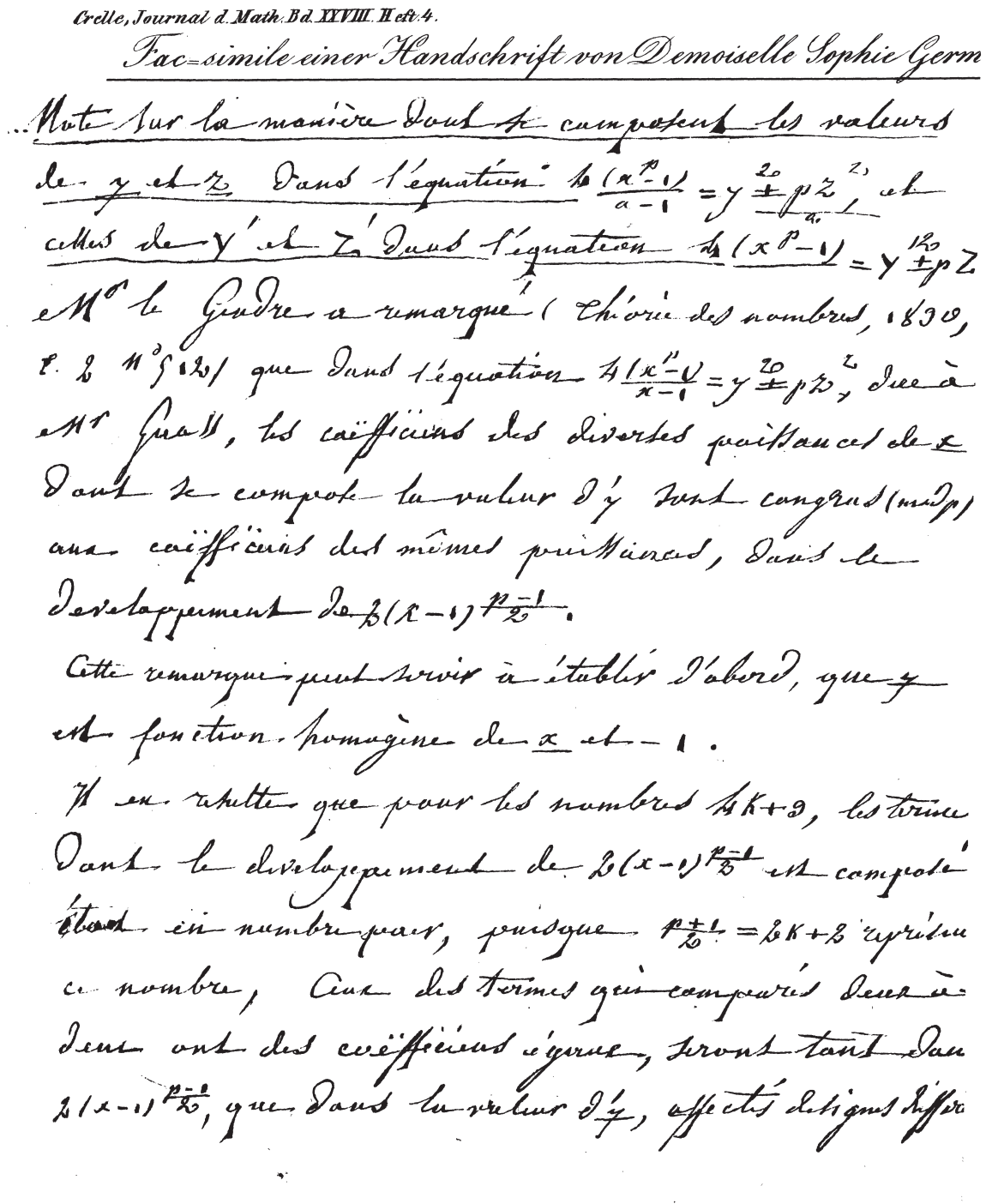
The Polish emigrant and Nobel Prize winner *Isaac Bashevis Singer (1902-1991)* transferred the story of Nawojka into a conservative Yiddish environment in 19th century Poland. He wrote a short story *Yentl, the Yeshiva Boy* (1962) which led to a Broadway Play *Yentl* (1975, Leah Napolin with coauthor Singer). In the Singer version, Yentl declares after her disclosure that she has 'neither one sex nor the other' and has 'the soul of a man in the body of a woman' and she opts to live as a man for the rest of her life.[71]

Based on the short story and Broadway play about Yentl, *Barbra Streisand (*1942)* transferred the story again and made Yentl a modern woman in a male-dominated environment in 19th century Poland. Starting with this project in 1968, she had to overcome many difficulties. Several people backed out, but finally she succeeded to realize her movie *Yentl* in 1983, putting in her own money. She then was actress, director, co-producer and co-author of the screenplay.[72] This payed off for the female viewers: there are structural, but no obvious similarities with their daily lifes. Thus this movie does produce laughter about some situations which usually are very annoying to many academic women.

**Sophie Germain - Monsieur LeBlanc** Much better known than Nawojka and much better documented is the life of *Sophie Germain (1776-1831)*. Nevertheless, it is also told in many different versions with contradicting details. We rely here mostly on a relatively recent paper on her correspondence with C.F. Gauss[73] which revealed results unknown and/or unpublished until then, and on the English Wikipedia article[74] with its many references. We avoid to mention doubtful facts.

She was born to a prosperous family in the center of Paris. When she was thirteen, the French revolution began, so she spent a lot of time at home. She started to read books from her father's very rich library, among others a book on the history of mathematics. When she read that Archimedes was killed by Roman soldiers because he did not want to interrupt his work on a mathematical problem for them, she was fascinated

[69] Martin von Leibitz 1464, [34], accessed on 2016-2-3
[70] Shank 1987, [53]
[71] en.wikipedia, accessed on 2015-12-12, keyword Yentl, [57]
[72] en.wikipedia, accessed on 2015-12-12, keyword Yentl(film), [57], and the references therein
[73] Del Centina, Fiocca 2012, [15]
[74] en.wikipedia, [57], accessed on 2016-2-16, keyword Sophie Germain


Crelle, Journal d. Math. Bd. XXVIII. Heft 4.

Fac-simile einer Handschrift von Demoiselle Sophie Germ

Note sur la manière dont se composent les valeurs de y et z dans l'équation $A\frac{(x^p-1)}{x-1} = y^2 \pm pz^2$, et celles de y' et z' dans l'équation $A(x^p-1) = y'^{12} \pm pz'^2$

M^r le Gendre a remarqué (Théorie des nombres, 1830, t. 2 n° 334) que dans l'équation $A\frac{(x^n-1)}{x-1} = y^2 \pm pz^2$, due à M^r Gauß, les coëfficiens des diverses puissances de x dont se compose la valeur de y sont congrus (mod p) aux coëfficiens des mêmes puissances, dans le développement de $2(x-1)^{\frac{p-1}{2}}$.

Cette remarque peut servir à établir d'abord, que y est fonction homogène de x et $-1$.

Il en résulte que pour les nombres $4k+3$, les termes dans le développement de $2(x-1)^{\frac{p-1}{2}}$ est composé étant en nombre pair, puisque $\frac{p+1}{2} = 2k+2$ exprime ce nombre, ceux des termes qui comparés deux à deux ont des coëfficiens égaux, seront tant dans $2(x-1)^{\frac{p-1}{2}}$, que dans la valeur de y, affectés de signes diffé-

Figure 4: Facsimile of a page of one of Germain's letters to Gauss, [21]

and decided to learn mathematics. For reading works of Euler and other scientists, she had to learn Latin and Greek as well. She started to work at night because she was afraid of the ridicule attached to 'femmes savantes', intimidated by Molière's *Les Femmes savantes* (1672). When her parents found out about her studies, they tried to stop her by removing the fire, her clothes and all candles from her bedroom in the evenings. She found a way of collecting secretly candles during the days, wrapped herself into the bedclothes at night and continued under these even harder conditions. Finally her parents gave in, her mother even supported her secretly.

When the *École Polytechnique* opened in 1794, she hoped to study there, but had to find out that *égalité* and *liberté* did not apply. Only men could study there. But in the new system of education there were lecture notes which she could obtain. When she turned in the required answers under the name *Antoine-August LeBlanc*, *Joseph-Louis Lagrange (1736-1813)* was surprized that the previously very weak student LeBlanc suddenly was the best of all. He asked for a meeting, and her true identity was disclosed. From then on, Lagrange gave her moral support and became her mentor. She could act openly under her name, but she never attained any position. Even after she won a prize of the French academy, she was not allowed to attend the sessions. The only women admitted there were the wives of members. This changed when she made friends with *Joseph Fourier (1768-1830)*, secretary of the Academy.

When Gauss' *Disquisitiones Arithmeticae* appeared, she worked through them, used some of his results for obtaining new results, and wrote a letter to him, again as M. LeBlanc[75], discussing his work, suggesting small improvements and presenting some of her own work in number theory. In later letters they also discussed questions of astronomy and work by Lagrange.[76] She also exchanged letters with several other leading mathematicians of her time, with *Adrien-Marie Legendre (1752-1833)*, *Guglielmo Libri*, *Poinsot* and others. Her letters are in various archives, in Paris, Göttingen (10 letters to Gauss), Florence (letters to Libri and Poinsot) and elsewhere. Figure 4 shows a page of one of her letters to Gauss.[77]

When Napoleon's troups invaded Germany, she got afraid that Gauss might suffer the fate of Archimedes and contacted general *Pernety*, a friend of the family. General Pernety sent a chief of a battalion to meet Gauss and make sure that Gauss was safe. When that person told Gauss that he came to see him because Mlle Germain was concerned about his safety, both men got confused because Gauss did not know anything about a 'Mlle Germain'. When she heard about this she wrote a letter to Gauss with explanations.

> In describing the honourable mission I charged him with, M. Pernety informed me that he made my name known to you. This leads me to confess that I am not as completely unknown to you as you might believe, but that fearing the ridicule attached to a female scientist[78] I have previously

[75] with postal address of *Silvestre de Sacy (1758-1838)*, a famous orientalist with contacts to Germany

[76] Günther 1881, [27], Del Centina, Fiocca 2012, [15]

[77] Crelle's Journal 28 (4), Berlin 1844, [21]

[78] ... 'mais que, craignant le ridicule attaché au titre de femme savante' ...; Del Centina, Fiocca 2012, p. 669, [15]; they both wrote in French

> taken the name of M. LeBlanc in communicating to you those notes that, no doubt, do not deserve the indulgence with which you have responded.[79]

And Gauss answered nine weeks later (i.e. very fast under the given circumstances)[80]:

> How can I describe my astonishment and admiration on seeing my esteemed correspondent M. LeBlanc metamorphosed into this celebrated person ... when a woman, because of her sex, our customs and prejudices, encounters infinitely more obstacles than men in familiarising herself with [number theory's] knotty problems, yet overcomes these fetters and penetrates that which is most hidden, she doubtless has the most noble courage, extraordinary talent, and superior genius.[81]

For the full French original text of all letters known until now (10 by Sophie Germain, four by Gauss) see Del Centina, Fiocca 2012 and the archives mentioned there.
Sophie Germain died of breast cancer on June 27, 1831.

> When the matter of honorary degrees came up in 1837 at the centenary celebration of the University of Göttingen, Gauss regretted exceedingly that Sophie Germain was no longer alive. "She proved to the world that even a woman can accomplish something worth while in the most rigorous and abstract of the sciences and for that reason would have well deserved an honorary degree," he said.[82]
>
> Among the documents for the centenary celebration preserved at the Historical Archives of the University of Göttingen, no record of Gauss's words has been found.[83]

*Why did the question of an honorary degree come up at the centenary?* Because the question of an honorary degree for a woman had been discussed at the 50th anniversay of University of Göttingen in 1787: the choice of the professors was the then young girl *Dorothea Schlözer (1770-1825)*, called *Freifrau Dorothea von Rodde-Schlözer* after her marriage in 1792. She was the daughter of one of the professors at the university and known in the whole city for her learnedness. When this honorary degree was offered to her, she and her father both denied: *no, not honorary, but achieved!*. The exam was given to her by eight professors and lasted 3 and a half hours. It took place in the house of the dean of the faculty of philosophy: she was not allowed to enter the buildings of the university. Also, she could not attend the ceremony related to the exam: her father received the document in her place, she watched through a little window.[84]

We may assume that *Karl Weierstrass (1815-1897)* knew this story when he decided to send *Sofia Kovalevskaya (1850-1891)* from Berlin to Göttingen in 1874, for her doctoral examination.

[79] Letter to Gauss (1807), MacTutor, [44], keyword 'A quotation by Sophie Germain'
[80] Günther 1881, [27]
[81] en.wikipedia, [57], keyword Sophie Germain
[82] Dunnington 1955, p.68, [17]
[83] Del Centina, Fiocca 2012, p. 636, [15]
[84] Göttinger Stadtgeschichte, `http://geschichtswerkstatt-goettingen.de/`, keyword Dorothea

**More Chosen Disguises**

In a joint paper, Richard von Mises and Hilda Pollaczek-Geiringer wrote as if they were two men:

> In einer Vorlesung über *Praktische Analysis*, die der erstgenannte Verfasser im Sommer-Semester 1927 hielt, kamen eine Reihe von Rechnungsverfahren zur Sprache, [...]. Es erschien zweckmäßig, einiges davon mit kurzer Begründung und Hinweisen auf die wichtigsten Anwendungen zusammenzustellen. Dieser Arbeit hat sich der zweitgenannte Verfasser - [...] - unterzogen; von ihm rühren auch wesentliche Ergänzungen und nähere Ausführungen sowie die Zahlenbeispiele her.[85]

If we look at the paper which introduced the *Crank-Nicolson Difference Scheme*,
J. Crank, P. Nicolson, Proc. Cambridge Philos. Soc. 43 (1947), p. 50[86]
the only indication that Phyllis Nicolson was a woman is her address: Girton College, the Women's college in Cambridge. Actually, *Phyllis Lockett - Nicolson - McCaig (1917-1968)* was hidden around 1970 in several respects: Born as Phyllis Lockett in 1917, she married Malcolm Nicolson in 1942 and changed her name to Phyllis Nicolson. After the death of her husband in a train accident in 1952, she married Malcolm McCaig in 1955 and adopted the name *Phyllis McCaig*.[87] She did work worth to be mentioned under all three names and was treated as three different persons in earlier texts about history of computers, mathematics and physics.

**Imposed Disguises**

*Emmy Noether (1882-1935)* was often called 'Der Noether' during her time in Göttingen (1909-1933). The group of her students there were often called 'die Noether-Knaben', the Noether boys, though there were also women in that group.[88]

*American Men of Science*, a biographical directory. The first volume of the series listed more than 4000 persons, 150 in physics, 80 in mathematics, 50 in astronomy,[89] more than 74 of them women. In the first three editions (1906, 1910, 1921) 445 female scientists were listed who were employed in academic institutions.[90] Nevertheless, the editors did not change the title before the 12th edition, in 1971, to *American Men and Women in Science*.

[85] v.Mises, Pollaczek-Geiringer 1929 , p.58, [43]
[86] Crank, Nicolson 1947, [13]
[87] MacTutor, [44], keyword 'Phyllis Nicolson'
[88] Dick 1981, [16]
[89] McKeen Cattell 1906, preface, [1]
[90] Rossiter 1984, p. 26, [50]

**Women!**

There was also a counter movement to make women visible: for several years some editors of books/proceedings and scientific journals persued the policy to abbreviate the first names of male authors, but give the full first names of female authors, at least for mixed teams of authors.

My co-author *Herbert B. Keller (1925-2008)* explained to me that it was the decision of Phys Fluids that our joint paper appeared as
Rita Meyer-Spasche and H. B. Keller (1985), Phys. Fluids 28, 1248.[91]

A similar policy was pursued by Springer Verlag in those years, as they confirmed to R. Gorenflo on his inquiry[92] concerning
R. Gorenflo and Marianne Niedack (1980), Computing 25, 299–316.[93]

Already much earlier, in the Proceedings of the Symposium of the International Astronomical Union in Stockholm 1956[94], the list of participants is given in this way: it gives the names of 86 participants from 15 countries, among them 5 with full first name. These women were from F, GB, I, N and S.

**Man of Science - Scientist**

Today, the word 'Scientist' is in common use. Surprizingly, it was invented not earlier than in 1833, and it needed a long time to be generally accepted. Many researchers did not like it in the beginning for two reasons: it summarized these many disciplines mathematics, astronomy, physics, chemistry etc. at a time when the whole field was getting fragmented by specialization, and it de-genders 'man of science'. On the other hand, exactly these two properties led to the invention of this term and made other people prefer it.[95]

*William Whewell (1794-1866)* was first a mathematician and poet, and later in his life a polymath, FRS, FGS. In addition to his other abilities, he was very good at inventing new words and was asked by friends and colleagues for help when they needed new terms for their discoveries. He suggested the terms *ion, dielectric, anode* and *cathode* to *Michael Faraday (1791-1867)*, and he coined the words *scientist, physicist*, and others. He used the word 'scientist' in 1833 in a speech, and printed it appeared for the first time in Whewell's anonymous review of the book 'On the Connexion of the Physical Sciences' by *Mary Somerville (1780-1872)*.[96]

# 6 Authors - Co-authors - Editors

There are surprizingly many articles and books which seem to be written by one or two authors, but then the inner title-page, the table of contents and/or the introduction/preface reveal that parts of the article/book were written by other authors. Our

[91] Meyer-Spasche, Keller 1985, [40]
[92] R. Gorenflo, personal communication
[93] Gorenflo, Niedack 1980, [25]
[94] Lehnert 1958, [31]
[95] Baldwin 2015, [2]; Merton 1990, [37]; Ross 1962, [49]
[96] en.wikipedia, [57], keyword William Whewell; MacTutor, [44], keyword William Whewell

first example was the book by Marsden/McCracken[97] in the subsection on Hopf bifurcation. In many cases, a professor gave the lectures, and his co-workers wrote (parts of) the lecture notes, but are not listed as co-authors. But times and practices have changed, and there are also older examples of professor/assistent as co-authors, as we have seen in the case of the v.Mises/Geiringer paper[98] in the previous section. Also, we give examples of authors who emphasized the influence of their teachers on their text.

## 6.1 Max Born: *Vorlesungen über Atommechanik*

The first example is Max Born: *Vorlesungen über Atommechanik*, 'herausgegeben unter Mitwirkung von Dr. Friedrich Hund';
*The Mechanics of the Atom*, By Max Born, translated by J.W. Fisher, MSc, PhD, and revised by D.R. Hartree, PhD.[99]
From the translated Preface to the German edition:

> [...] For the fact that it has been possible to publish these lectures in book form I am indepted in the first place to the co-operation of my assistant, Dr Friedrich Hund. Considerable portions of the text have been prepared by him and only slightly revised by me. Many points, which I have only briefly touched on in the lectures, have been worked out in detail by him and expounded in the text. [...] I also wish to thank other collaborators and helpers. Dr. W. Heisenberg has constantly helped us with his advice and has himself contributed certain sections [...]. Dr. L. Nordheim has assisted in the presentation of [...], and Dr. H. Kornfeld has verified numerous calculations.[100]

## 6.2 Gelfand: *Some problems in the theory of quasilinear equations*

An often cited paper (more than 300 citations from *Web of Science Core Collection* until now) is the article by Gelfand[101]. Random inspections suggest that most of the citing papers refer to the *Gelfand problem* treated in §15, i.e. to the treatment of the Dirichlet problem

$$\Delta u + \lambda e^u = 0 \text{ in } \Omega, \qquad u|_{\partial\Omega} = 0 \qquad \Omega \subset I\!R^n,\ n = 1, 2, 3 \tag{1}$$

$\Omega$ a symmetric vessel, and closely related problems. Variants of this equation are relevant for many applications in astrophysics, plasma physics[102], chemistry and elsewhere. Moreover these equations have properties which make them interesting for pure mathematicians and for numerical analysts.

[97] Marsden/McCracken 1976, [33]
[98] v.Mises, Pollaczek-Geiringer 1929, [43]
[99] Born 1925, English 1927, [5]
[100] Born 1927, from the Preface to the German edition, [5]
[101] Gelfand 1959/1963, [20]
[102] Meyer-Spasche 1976, [41]

Maybe the 'Gelfand Problem' should have been named the *Barenblatt Problem* or the *Frank-Kamenetskii Problem*. But today there are other problems known under these names.

In the introduction of Gelfand's paper we read:

> The present article is based on a course of lectures delivered by the author in 1957-1958 at the Moscow State University. The notes of these lectures were written up by K.V. Brušlinskiĭ and K.V. D'jačenko; without their participation, this article could not have been published. [...] §15 was written by G.I. Barenblatt, who also made several comments on §§16 and 17.[103]

And in §15 we read that the presentation follows Frank-Kamenickiĭ. Also, several references of the article are related to the topics of §15: the book by Frank-Kameneckiĭ, a paper by Zel'dovič and a paper by G.I. Barenblatt and Ja.B. Zel'dovič.

## 6.3 Chandrasekhar: *Hydrodynamic and Hydromagnetic Stability*

Let us also look at the very impressive book by Chandrasekhar[104]. In the preface we read:

> [...] In the writing of this book I have received co-operation and assistance, in generous measure, from so many that in order to be reasonably complete I have listed them separately. I should, however, like to mention here the extent of my obligation to Miss Donna D. Elbert: in a real sense this book is the outcome of our joint efforts over the years and without her part there would have been no substance.

Then follow one and a half pages of acknowledgements to experimenters and theoreticians, to editors and publishing companies, to contractors and to those supporting people who usually are not mentioned, like Mr Norman R Wolfe who inked all the line drawings. We also read there

> [...] in several instances new computations or new experiments were necessary. [...] Miss Donna D. Elbert carried out the relevant numerical calculations for most of the problems treated in the book; she is responsible for the numerical information included in all of the tables with the exception of Tables [...].[105]

Some co-authors have done much less work for a book than Donna D. Elbert.

## 6.4 Courant-Hilbert

A very special case are the books by *Richard Courant (1888-1972)* with co-author *David Hilbert (1862-1943)*, *Methoden der Mathematischen Physik/Methods of Mathematical Physics*[106]:

[103] Gelfand 1959/1963, Introduction, [20]
[104] Chandrasekhar 1961, [11]
[105] Chandrasekhar 1961, Acknowledgements, [11]
[106] Courant-Hilbert 1924, 1937, 1953, 1962, [12]

Around 1922 Courant discussed 'the plan of a work on mathematical physics' with Hilbert, but 'Hilbert could not participate in carrying out the plan'.[107] So Courant wrote the book alone, but named Hilbert as co-author:

> The responsibility for the present book rests with me. Yet the name of my teacher, colleague, and friend, D. Hilbert, on the title page seems justified by the fact that much material from Hilbert's papers and lectures has been used, as well as by the hope that the book expresses some of Hilbert's spirit, which has had such a decisive influence on mathematical research and education.[108]

This unusual proceeding was discussed, of course, in the reviews when the first volume appeared. One of these reviews was written by the physicist *Paul Peter Ewald (1888-1985)*. Ewald attended Hilbert's lectures in 1906 and had the paid job to write the lecture notes for his co-students, with help of Hilbert's assistent. Later on Ewald was Hilbert's physics assistent.[109] He wrote:

> Actually it is more than a mere act of dedication that Hilbert's name stands next to that of Courant on the title page. [...] Hilbert's spirit radiates from the entire book – that elemental spirit, passionately seeking to grasp completely the clear and simple truths, pushing trivialities aside and with masterful clarity establishing connections between the high points of recognition – a spirit that filled generations of searchers with enthusiasm for science.[110]

Starting with the second edition of Teil 1 in 1930, Courant had always help with revising and improving existing editions and writing additional sections or appendices on new developments. This is documented in the prefaces and in the tables of contents. Only one name, the name of *Kurt Otto Friedrichs (1901-1982)* occurs every time, the other names change from edition to edition. Courant's words about these assistances:

> The present publication would have been impossible without the sustained unselfish cooperation given to me by friends. Throughout all my career I have had the rare fortune to work with younger people who were successively my students, scientific companions and instructors. Many of them have long since attained high prominence and yet have continued their helpful attitude. [...] That this volume is dedicated to K.O. Friedrichs is a natural acknowledgement of a lasting scientific and personal friendship.[111]

## 6.5 Hockney, Eastwood: *Computer Simulation Using Particles*

Hockney, Eastwood's book was the first book on the then young subject of numerical simulation using particles.[112] In the preface we read:

[107] Courant-Hilbert vol 2, 1962, Preface, [12]

[108] Courant-Hilbert, vol 1, 1953, Preface; translation of a similar text in the Vorwort zur ersten Ausgabe, Teil 1, 1924, [12]

[109] Reid 1970, pp. 107-109, 133, 171, [48]

[110] from Ewald's review of Courant-Hilbert Teil 1 in *Naturwissenschaften*, in: Reid 1970, p. 171, [48]

[111] from the preface, Courant-Hilbert vol 2, 1966, [12]

[112] Meyer-Spasche 2011, [38]

> The inspiration behind our interest in simulation using particles is undoubtedly that of Oscar Buneman, to whom we gratefully dedicate this book. His ideas run like a thread through all aspects of the subject.[113]

And their dedication reads:
To Oscar,
Founder of the Subject

# 7 Acknowledgement

The author is very grateful to all who improved this work by their criticism, questions and remarks. Special thanks are due to Danuta Ciesielska for her detailed informations about Nawojka and to Menso Folkerts for his informations about Gauss-Germain and the paper Del Centina, Fiocca 2012. Very special thanks are due to Ulrich Reich for his email with additional informations, the material for Figures 2 and 3, and a preprint of his article about Melanchthon.

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