

# Newsletter

BELGIAN MATHEMATICAL  
SOCIETY

# 130, November 15, 2020

Comité National de Mathématique CNM

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NCW Nationaal Comité voor Wiskunde

## Newsletter of the Belgian Mathematical Society and the National Committee for Mathematics

Belgian Mathematical Society ASBL/VZW  
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The next edition of this newsletter will appear on January 15th, so from now till January 8th all content can be sent to [wendy.goemans@kuleuven.be](mailto:wendy.goemans@kuleuven.be). Any information that you qualify as interesting to be spread among the Belgian Maths community is very much welcomed! Examples of such information are: PhD defenses, seminars, conferences, workshops, meetings, interaction with other sciences or business companies, popular lectures, school initiatives, math exhibitions, job opportunities, ...

## Foreword

Dear BMS members,

As we are now slowly settling into this new virtual reality, it is my pleasure to write to you that things are finally happening again with the BMS. First of all, in light of the 2020's reduced activity, we have decided that we would offer free membership for next year, see below for more detail. Also, more new news about our activities will soon be available (including a new logo, an improved website, and several other surprises); to keep in touch with this, with us, and more, please see the invitation below to our next General Assembly which will take place December 2 PM.

As always, feel free to write to us if you have input which you want to share or if you identify anything that we can do for you.

Looking forward to e-meeting you on December 2nd,

Philippe, Wendy and Yvik

## 1 News from the BMS & NCM

### 1.1 Online General Assembly: December 2

We are happy to invite all members of the BMS to take part in our annual General Assembly on  
Wednesday December 2 from 5PM to 6PM

This event will take place online. Seeing that we are already all overloaded with online seminars, we have decided to keep it short and simple, and reserve all surprises for next year. Your participation is nevertheless essential, and we thank you in advance for showing up, even virtually.

Obviously, attendance is free, but registration is compulsory. Please send an email to [yvik.swan@ulb.be](mailto:yvik.swan@ulb.be) at your best convenience but no later than Sunday 29th November; an online invitation will be sent to all registered participants along with additional documentation and information in preparation for the GA.

Here is the agenda:

1. Approval of BMS statutes revision
2. Constitution of the board\*
3. Accounts
4. Jobs in the board
5. News from the bulletin
6. Sponsoring
7. Past and future activities
8. Miscellaneous\*\*

\* Some colleagues have already signaled their wish to join the board in the future, and we thank them very much for this. If you wish to also take part, please contact us and signal this: all help is welcome!

\*\* If there is anything you wish to have discussed during the meeting, please send us a mail beforehand so that we can adequately prepare!

## 1.2 Membership 2021

Since there were no activities organized by the BMS in 2020, the BMS board decided that all members who paid their membership fee for 2020 receive their 2021 membership for free: they are automatically a BMS member in 2021. If you were a member in 2020, no action is needed from your part. If you have questions concerning this please (e.g. if you have combined memberships) do not hesitate to contact us (see email address below).

To check whether you were a member in 2020, go to our [online database](#). Try typing your family name in the search box. If you agreed to have your institution and e-mail in our public database at the time you became a member, you will see your institution and e-mail address. You will also see the year in which you last paid your dues. *If you forgot to pay for more than one year, you will get no response from our database as you are not a member anymore!* In this case we suggest you to re-apply for membership by filling out the online form at <http://bms.ulb.ac.be/membership/appliform.php> and paying your membership dues for 2020–2021 (via **BIC: GEBABEBB / IBAN: BE70 0011 7447 8525** or via [paypal](#)). If you find the database to be inaccurate, or if you have any other questions, please contact us at [bms@ulb.ac.be](mailto:bms@ulb.ac.be).

## 1.3 Bulletin of the Belgian Mathematical Society - Simon Stevin

Volume 27, Numbers 4 and 5, of the Bulletin of the Belgian Mathematical Society - Simon Stevin will appear soon. These two volume numbers are the last that appear in printed version. From Volume 28 on, the Bulletin will only appear in electronic form. Remember, as a member of the BMS you can ask for electronic access to all electronically available issues of the bulletin. If you don't have a login yet, contact [pcara@vub.ac.be](mailto:pcara@vub.ac.be).

For the table of contents of previous issues, see <https://projecteuclid.org/all/euclid.bbms>.

## 2 (Online) Meetings, Conferences, Lectures, ...

### 2.1 Meetings and conferences

#### Altair programme des conférences 2020-2021

Le Centre d'Histoire des Sciences et des Techniques reconnu par le Conseil de la Recherche de l'ULB présente 7 conférences qui ont lieu le samedi de 10 heures à midi. Programme de 2020-2021:

- postponed: **Franklin Lambert** (VUB-Instituts Solvay) Nouveau coup de projecteur sur l'origine singulière des Conseils Solvay
- 12 décembre 2020: **Pascal Godefroit** (Institut royal des Sciences naturelles de Belgique) La ruée vers l'os: la découverte des Iguanodons de Bernissart il y a 140 ans **online in zoom**
- 6 février 2021: **Marius Gilbert** (FNRS-ULB) Epidémiologie de l'instant: de l'analyse de données à la communication et à la décision durant la crise du covid
- 27 février 2021: **Damya Laoui** (Lab of Cellular and Molecular Immunology VUB-VIB) Comment utiliser ses propres cellules immunitaires contre le cancer?
- 13 mars 2021: **Edwin Zaccai** (IGEAT, ULB) Les sociétés face au changement climatique
- 27 mars 2021: **Marc Moyon** (Univ. Limoges, CNRS, XLIM), Al-Khwârizmî en Europe ou la résolution des équations en latin

- 24 avril 2021: **Davy Paindaveine** (ULB) Quelques paradoxes dans le monde de l'aléatoire

Suivant l'évolution du COVID, les conférences peuvent être maintenues, données en visioconférence ou supprimées. Il est donc nécessaire de s'inscrire à chaque conférence sur le site:

<https://forms.gle/6pECzDshwemNgZxY8>

Avant chaque date vous serez avertis par mail de la situation. Si la conférence se donne en salle (Campus Plaine de l'ULB, Forum, auditoire B), les mesures de sécurité seront appliquées et le nombre d'auditeurs réduits. Il faudra être inscrit pour entrer. Des renseignements complémentaires peuvent être obtenus

- sur le site <https://www.facebook.com/Altair4ULB/>,
- au numéro de téléphone 02/650.28.34 (A. Jorissen),
- aux adresses électroniques: [ajorisse@astro.ulb.ac.be](mailto:ajorisse@astro.ulb.ac.be), [llemaire@ulb.ac.be](mailto:llemaire@ulb.ac.be).

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## 2.2 January 2021

### Riemannian Geometry and Applications-RIGA 2021

January 15-17, 2021

See all information on <https://fcfdp.utcb.ro/riga-2021/>.

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## 2.3 Seminars and colloquia

### Universiteit Antwerpen: Analysis & Geometry Seminar

Online on Wednesdays 16.00 - 17.00

Scheduled online talks:

- November 18th: **Güner Muarem**
- November 25th: **Yannick Gullentops**
- December 2nd: **Wouter Van den Haute**
- December 9th: **Tim Verdonck**

For titles and all information, see <https://www.uantwerpen.be/nl/personeel/sonja-hohloch/private-webpage/seminars/analysis—geometry-/>

## 3 History, maths and art, fiction, jokes, quotations ...

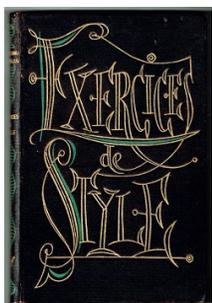
### 3.1 Adhemar's corner

Three book reviews of Adhemar Bultheel and Paul Levrie on writing mathematics in different styles.

**99 Variations on a Proof**, Philip Ordning, Princeton University Press, 2019 (168 p.) isbn: 978-0-691-15883-9.

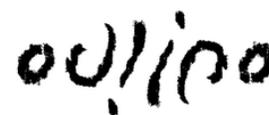
I have reported on oulipo (**Ouvroir de littérature potentielle**) before in this Newsletter. This group which is a mixture of French writers and mathematicians was founded in 1960 and they wanted to explore new structures for writing, constraints imposed by symmetry or patterns, almost like mathematics is developed in a strict logic framework, yet looking for elegant and beautiful results.

One of the earliest of these experimental writings was *Exercices de Style* (1947) by Raymond Queneau (a poet but also an amateur mathematician), one of the founders of oulipo. A simple story is told and retold, 99 times, about a man getting on the bus where he witnesses a man with a long neck and someone else who are having a row, but each time the story is told in a completely different style.



There are several ways to organize symmetry or patterns. Permutation of words or random selection of sentences, or drawing  $n$  sentences from  $n$  collections, of which the first collection consists of opening sentences, and the  $n$ th is a set of closing sentences. In this way  $n!$  different stories can be composed. Queneau also applied this technique, writing 10 sonnets, and you can choose every line from one of the 10 possibilities, and so published it as *Cent Mille Millions de Poèmes*.

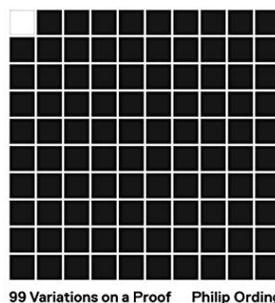
Palindromes are an excellent example of how one can find inspiration in writing something that you can read from left to right or from right to left. Ambigrams are graphical representations of a word or text that looks exactly the same if you turn it upside down. They were also popular at the Martin Gardner meetings.



This idea of *Exercices de Style* has triggered several authors to produce something similar, and it must have inspired Ordning also to collect in this book 99 variations of a proof. What is proved here is always the same, but otherwise completely irrelevant: the cubic equation  $x^3 - 6x^2 + 11x - 6 = 2x - 2$  has a double solution at  $x = 1$  and a third one at  $x = 4$ .

In fact, there are actually 100 proofs, since proof number 0 is symbolized by the white square on the cover of the book and it is a proof that has been omitted (as we sometimes also read in published mathematical papers: Formulation of the theorem, followed by *Proof*: Omitted.  $\square$ ). Other proofs are more obvious and I am sure you can think of some. A compact proof of just one line for example, or the opposite, a proof where all steps are written out with in the margin an explanation of the rule, property or operation that has been applied, or a graphical proof or using geometric arguments, etc. Also traditional proofs like by contradiction, induction, or exhaustion, but still you may realize soon that to come up with 99 variations is far from a trivial task.

So Ordning has been very creative, and he probably has been collecting ideas over several years. There is certainly a selection that that is inspired by several mathematical disciplines: topology, linear algebra, or probability. Then you might think about the way they appear, and that opens



Philip Ordning

a new box of possibilities: in an email, a blog, a tweet (here presumably sent by Cardano), a newspaper text, using a flow chart, on a blackboard, a pre- or postfix formal language, typeset in L<sup>A</sup>T<sub>E</sub>X, in preprint or published form, the messy way of how students sometimes produce a proof at an exam, and even using a music score and one using origami, ...

There is also a proof “On the back of an envelope”, i.e., short calculation on a little piece of paper, a form of calculation for which Enrico Fermi was famous. There is also an illustration from a book by Cardano in which he explains how to solve a cubic equation, a proof in Babylonian cuneiform symbols and a medieval text. A collaborative proof is inspired by the way people collaborated on the twin prime conjecture in the Polymath project as set up by Yitang Zhang and Terence Tao.



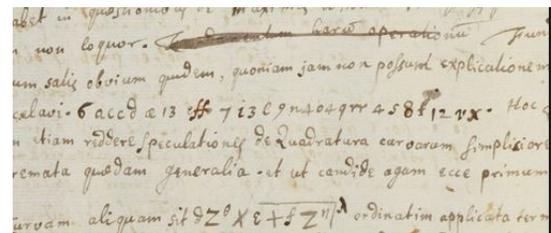
Yitang Zhang



Terence Tao

And there are some fun ones, like a psychedelic (a Mandelbrot-like plot of the attraction basins for the roots of the polynomial equation), mystical, social media, a screenplay, or a nonsense proof in the style of Lewis Carroll, or perhaps in verse, or how proofs are conceived during conversations at coffee breaks, a proof using only one syllabic words (that is typical oulipo, Perec wrote a novel without the letter e appearing once), etc. A paranoid proof refers to the time when mathematicians published their results in riddles so that they could prove later that they had it already if some priority issue did arise. Galileo mailed Kepler the anagram ‘smaismrmilmepoetaleumibunenugttauiras’ in 1610. Of course the original text was in Latin, but translated its hidden message was “I observed the highest planet to be triple bodied”, which refers to the rings of Saturn. However Kepler unscrambled the anagram wrongly and thought that it was about Mars having two moons. But also Newton has sent such an anagram to Leibniz (via Oldenburg) which read ‘6accdae13eff7i3l9n4o4qrr4s8t12ux’ (read 6 a’s, 2 c’s, 1 d, 1 æ, 13 e’s,...) in which he hides the ‘method of fluxions’ (Newton’s calculus). Ording has hidden some extra symmetry for the reader to discover. For example the ancient proof by Babylonian characters is number 16, while there is also a modern proof that is numbered 61.

The majority of the proofs take not more than a few lines to half a page. They are given on the odd numbered pages, and on the back, he gives some explanation, perhaps some historical context or just explaining how the “proof” on the other side of the page should be understood.



Newton’s anagram

This is a fun book, and yet it has a lot of information, not essential or high brow mathematics, but still entertaining chit-chat info that is nice to know. It is also not a book that you will read cover to cover. You can pick up the book from time to time and read one or two of the proofs and Ording’s comments. Some of the proofs are really smart and witty. Many references are given as notes at the end of the book to justify what has been claimed, and there is also cross referencing when a proof can be compared to another one.

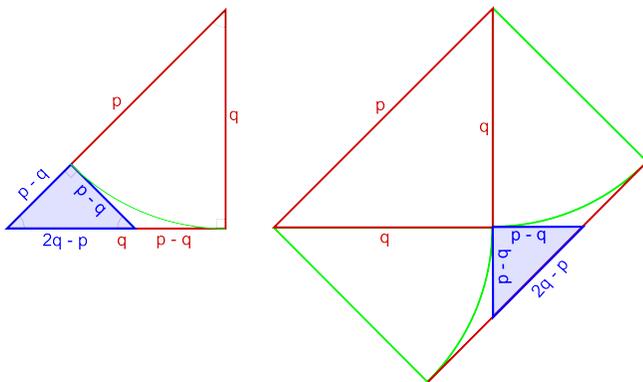
Adhemar Bultheel

**Rationnel mon  $\mathbb{Q}$ , 65 exercices de styles**, Ludmila Duchêne and Agnès Leblanc, Hermann éditeurs, 2010 (158 p.) isbn: 978-27056-7031-3.

In the introduction to his book 99 Variations on a Proof Philip Ording mentions this book which appeared in 2010. As the title suggests, it has something to do with irrationality. The internet doesn't provide much information about the authors Ludmila Duchêne and Agnès Leblanc. If we believe the editor's website Ludmila Duchêne is none other than the mathematician and oulipo member Michèle Audin. But on the author's website,

<http://a.leblanc5.free.fr/>, if we click on the name Agnès Leblanc we get a short biography of Ludmila Duchêne. Date of birth isn't right, but the rest seems okay. But, on the website <http://www.fatrazie.com/>, oulipo-related, we read: *Michèle Audin also assures her support to two young mathematicians who have just published Rationnel mon  $\mathbb{Q}$ .* Also note that a.leblanc is probably an allusion to Monsieur Le Blanc, better known as Sophie Germain, making it uncertain that Agnès Leblanc is the real name of the second author... And of course there's the anagram, not a perfect match, but still... They are playing games with us, typically oulipo.

The book is very similar to the book by Ording. In it are 65 'proofs' in different styles for the fact that the square root of  $\sqrt{2}$  is irrational. Here are some examples. One of the proofs has the title MONOPHRASE (remember that the book is in French), meaning 'in one sentence', one and a half pages long. At the end there's this: *...curieusement signés par A. Leblanc, les initiales du pseudonyme choisi par Sophie Germain et L. Duchêne, des pseudonymes aussi sans doute,....* Note that in this 'proof' there's only mention of the classical proof of the irrationality of  $\sqrt{2}$ , not a real proof. Sometimes there is, even a new one, I guess: Under the title BEWEIS OHNE WORTE you'll find the classical one (on the left) and the new one (on the right).



there's a list of some of the constraints used in writing down the different proofs, for instance the lipogram: a proof without the letter 'e'. Note that this might seem easy if you use only mathematical symbols, but this is not the case here. (The lipogram is one of the favourite forms used by oulipo. For your information: oulipo-author Georges Perec wrote a whole book without the letter 'e', La Disparition – which left him with so many unused e's that three years later he wrote a book in which only that vowel is used, Les Revenentes.) And there's certainly much more to be discovered in this very nice book.



Ludmila Duchêne?

Ludmila Duchêne  
 Michèle Audin  
 Audin's anagram?

An especially nice one is the UNE DÉMONSTRATION DIGRESSIVE DE L'IRRATIONALITÉ DE LA RACINE CARRÉE DE 2, where the proof is surrounded by a big digression into the history of mathematics (Cardano, Peano, a too small margin,...). At the end the authors thank the SNCF (the French railway Company) for the TGV 6201 and 6222 where the writing of this part of the book was started and (hopefully) finished.

And it goes on like this. There are numerous footnotes, some of them very funny. At the end

**Exercises in (Mathematical) Style**, *John McCleary*, MAA Press/AMS, 2017 (xiv+275 p.) isbn: 978-1-4704-4783-8.

Ording's *99 Variations on a Proof* (2019) and *Rationnel mon  $\mathbb{Q}$ , 65 exercices de style* (2010) by L. Duchêne and A. Leblanc (which is possibly M. Audin) are not the only mathematical books that are inspired by R. Queneau's *Exercices de Style* (1947). Also the present book by McCleary is presenting 99 short stories (not more than three pages each) of properties involving binomial coefficients.

Of course binomial coefficients are an easy subject and they show up in many different practical situations, while the mathematics is often not demanding and can be followed by most readers with an elementary knowledge of mathematics. Only some of the stories require (elementary) calculus and fewer even go beyond that. The items that require calculus get a star, two stars for complex numbers and three stars if more is required.

Unlike Ording who is presenting proofs of one and the same property, McCleary's short stories involve many different things (but mostly proofs) related to binomial coefficients. Because counting and choosing  $k$  from  $n$  or distributing  $n$  over  $k$  can appear in so many different contexts there are many ways to present a property. Some of the stories are just historical facts, while others are fictitious with dialogues, in which the persons are discussing the problem.

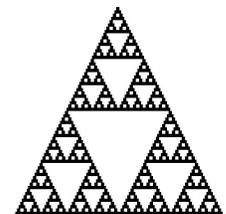


Raymond Queneau  
1903-1976

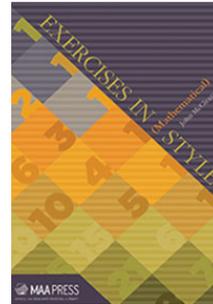
We also find several styles of poems, a music score, a puzzle, graphical proofs, proofs without words, several letters, a stage play, a lipogram (no letter 'e'), a book review, tweets, etc. Many of the stories are inspired by an historical fact or event: a letter from Gauss to M. LeBlanc (Sophie Germain), a discussion between Newton and Abel. There are several fictitious letters for example one by Newton written in his style, one by Leibniz signed as Georgius Ulicovius Lithuanus (an alias that he used when a political sensitive matter was discussed), and one letter to a princess by Euler (referring to the historical *Letters to a German Princess* that he wrote to Friederike Charlotte of Brandenburg-Schwedt and her sister). However, several of the proofs are just classical mathematical ways to prove things, only the property that is proved

is different, but I would not count that as different *styles*, they are just different properties. But there are quite different mathematical styles of course. A proof of a property à la Bourbaki is definitely different from an elementary classroom proof. An original example is a kind of puzzle where formulas and words (grouped by word type) are given and the problem is to put them together to form a proof. Another one, called *Mutperation satticsits*, is about permutation statistics and is completely written in a dyslectic phrasing. Not all of the stories are proofs or require action from the reader tough. The first one for example is just introducing the notation.

On the mathematical side we of course find statistical aspects, but we also find several problems relating combinatorics to prime numbers. The reader is also confronted with some  $q$ -theory, cellular automata, tilings, generating functions, hypergeometric series, and some calculus and elementary algebraic structures, Pascal's triangle is often used to derive the elementary properties. It also appears when cellular automata are discussed and Pascal's triangle modulo 2 or 3 leads to a Sierpinski triangle.



As the other two Queneau-inspired books, this is again one written by somebody who is savouring the joy of math, and that is very contagious. The stories give historical background, they can inspire teachers to design exercises, or you can read a story for fun instead of swiping 10 minutes of your life away on your smartphone.



John McCleary

Adhemar Bultheel