Bienvenue au numéro de février des *Notes de la SMC*

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Javad Mashreghi

La crise de quarantaine frappe à nos portes, comme le nom l'indique, vers la quarantaine. Ses causes, explicites et implicites, sont souvent des préoccupations quant à l'insuffisance ou l'absence du revenu, la rupture dans le couple, la maladie, etc. La Société mathématique du Canada qui va bientôt avoir quatre-vingts ans fait face à une crise qui, compte tenu de la durée de vie des sociétés de même taille, pourrait être qualifiée de crise de quarantaine! Nous devons penser à la survie. Sinon, la SMC sera simplement une donnée statistique dans la roue géante de l'histoire. Ou bien la crise actuelle sera une autre évidence de la crise de quarantaine des sociétés scientifiques. Examinons ces problèmes de près afin d'en trouver des solutions concrètes.

Étant donné les temps étranges que nous vivons, il n'est pas surprenant que tous les doigts soient pointés vers les variantes de la COVID. Elles sont, après tout, responsables d'une pandémie mondiale. Il est donc tout naturel de les tenir également responsables de nos problèmes. Effectivement, il est vrai et, malheureusement, inévitable, que la COVID nous a privés d'une partie de nos revenus et est le principal coupable. On s'attend au pire encore. Or, nous devons être en même temps juste et prudent dans notre évaluation. Le virus n'est pas responsable de tous nos problèmes et tant que nous l'accusons d'avoir causé tous nos maux nous ne trouverons pas de véritables solutions à la crise devant nous. Une analyse approfondie de la structure financière de la SMC, de ses bric-à-brac, de ses projections, etc. nous incombe. J'aimerais d'abord reconnaitre l'aide du gouvernement fédéral au cours de deux dernières années. La SMC a pu bénéficier de plusieurs programmes d'aide offerts par le gouvernement pour atténuer l'impact de la pandémie. Sans ces aides généreux, la situation financière de la SMC aurait été entièrement différente.

Le prochain élément dans la liste est nos réunions. Depuis longtemps, la CMS a organisé deux réunions semi-annuelles; la réunion d'hivers tenue normalement dans les grandes villes canadiennes, et la réunion d'été dans d'autres régions du pays. En règle générale, les réunions d'hiver ont eu une plus grande participation. Ces deux évènements ont été essentiels pour les membres de la SMC et de la communauté mathématique en général. Actuellement, les réunions ont été impactées par une gamme de problèmes entrelacés, chacun nécessitant une évaluation approfondie.

Le premier de ses problèmes concerne la COVID. Depuis l'été dernier, nous organisons les réunions en ligne. Mais nous ne sommes pas les seuls à le faire. Depuis le début de 2020, on a vu apparaître un grand nombre de réunions en ligne partout dans le monde. Au début, c'était vu par la communauté comme une activité nouvelle et attrayante. Or, plus nous vivons avec la pandémie, plus nous nous lassons des activités en ligne. Les étudiant.es sont souvent absent.es des cours virtuels. Le taux de participation aux réunions virtuelles baisse. Notre dernière réunion virtuelle n'en était pas une exception. Naturellement, cela nous inquiète surtout pour notre prochaine réunion d'été.

D'une part, nous ne sommes plus certains de la durée de ces temps exceptionnels. Il est difficile et peut-être même imprudent d'offrir une prédiction. D'une autre part, même si tout reprend son cours normal, il me semble qu'il y a une volonté de part de la communauté de garder certains éléments virtuels en parallèle avec la composante présentielle. Dans les deux cas, que les réunions soient entièrement virtuelles ou hybrides, la SMC n'y tire aucun avantage financier et malgré leur importance au sein de la communauté, ces réunions commencent à devenir un fardeau financier qui pèse sur les épaules de la SMC.

La relation entre la SMC et les instituts mathématique est un autre point délicat qu'il faut soulever, analyser et « redéfinir ». L'émergence des instituts de recherche mathématique à travers le pays, offrant des programmes thématiques, des ateliers, des colloques internationaux hebdomadaires, etc. tout au long de l'année, remet en cause l'importance des réunions d'été et d'hiver de la SMC. Ce problème a déjà été mentionné par l'éminent ami de la SMC, le professeur Juris Steprans dans un article intitulé « Les Réunions de la SMC atteignent-elles leurs objectifs? » (*Notes de la SMC*, décembre 2018) Je crois que les instituts et la SMC doivent collaborer et coordonner leurs activités.

La SMC a proposé la formation du comité des instituts mathématiques et l'objectif est de représenter la vie mathématique au Canada à d'évènements internationaux importants tels que les Joint Mathematics Meetings (JMM), le Congrès international de mathématiciens (ICM), le Congrès européen de mathématiques (ECM), Mathematical Congress of the Americas (MCA), etc. Ce comité, qui n'est pas encore officiellement formé, tâchera de rassembler les représentant.es des instituts pour discuter de l'avenir des réunions mathématiques au Canada et des collaborations et responsabilités mutuelles.

La publication pose le plus grand problème à la SMC. D'une part, l'éditeur a projeté une baisse drastique du revenu pour la SMC. Comme d'habitude le blâme tombe sur la COVID et ses implications résultant à une baisse de revenus pour l'éditeur, ce qui se reflète directement dans les projections de revenus des clients, dont la SMC. De l'autre part, nous nous rapprochons de l'ère du libre accès. Dans trois ans, toutes les publications seront en libre accès. Cela ajoute d'autres couches de complexité au problème. Je crois fortement que c'est un problème que mes successeurs doivent prendre au sérieux. Si la SMC ne trouve un remède à ses problèmes de publication, je ne vois pas comment elle pourrait survivre.

Tous les membres des comités de la SMC sont des bénévoles. Au cours des 5 dernières années de mon implication au sein du comité exécutif, j'ai constaté que le comité des candidatures avait de la difficulté à remplir les postes vacants. Pire encore, la directrice générale de la SMC a dû assumer certains rôles du comité des candidatures à cause de la pénurie des bénévoles. L'absence des jeunes bénévoles, et la réticence des collègues plus établi.es à s'engager aux activités de la SMC est un grave problème. La SMC a une grande structure administrative et a dont besoins des mathémati-

cien.nes dévoué.es dans tous les comités.

Enfin, cet article tâche de souligner quelques problèmes majeurs auxquels fait face la société. Cette liste n'est pas exhaustive. Il y a des problèmes que je n'ai pas encore abordés. Mais en somme, deux mesures importantes sont nécessaires : d'abord, d'examiner de près la situation actuelle pour repérer des problèmes existants. Et deuxièmement, afin de s'attaquer auxdits problèmes. Ce dernier nécessite une analyse et une mise en œuvre sérieuses. La SMC a besoin de votre aide.

Omicron?

Éditorial

Février 2022 (tome 54, no. 1)

Robert Dawson (Saint-Mary's University)
Editor-in-Chief

Tout allait reprendre son cours normal cette session. L'enseignement hybride à l'automne, qu'on disait, et le retour au bon vieux temps à l'hiver. Or, comme nous le savons tou.te.s, est ensuite arrivé Omicron et tout s'est effondré.

Je sais : vous en avez assez de lire un éditorial de plus sur la COVID. J'en ai moi aussi assez d'en écrire un autre. Donc, je ne le ferai pas. Je vous parle plutôt de…

Je me suis bien amusé à entendre les gens qui appelaient la nouvelle variante « Omnicron » ou « Omnicon ». C'est logique : jusqu'à il y a à peine quelques mois, ce n'était pas un nom que la plupart des gens entendaient souvent. En dehors d'associations étudiantes (et de l'usage chrétien d' « Alpha et Omega), les lettres grecques sont le plus souvent utilisées dans des contextes scientifiques ou elles ne sont pas utilisées du tout. Omicron n'est pas une lettre qu'on utilise souvent en mathématiques ou en physique parce qu'elle n'a pas de glyphe distinctif. Les astronomes s'en servent parfois, mais pour nommer la quinzième étoile la plus brillante dans la constellation, ce qui ne la donne pas trop d'importance.

Heureusement, nous n'avons jamais eu un nombre aussi grand de tempêtes tropicales dans une même année pour que les météorologues nous avertissent de l'ouragan omicron. De toute façon, l'OMM a abandonné l'alphabet grec comme source de noms de tempêtes. Certaines « tempêtes grecques » de 2020 ont été assez importantes en sévérité que le protocole a exigé la retraite de ces noms – et on a estimé qu'on ne pouvait pas en retirer des simples lettres, alors ils se sont tournés vers une autre liste alphabétique de prénoms.

Peut-être qu'ils se sont prononcés trop tôt. Après tout, la Grèce classique a abandonné des lettres de temps en temps. Où sont digamma (Ϝ) , stigma (Ϛ), koppa (Ϟ) et sampi (Ϡ)? Et ma question n'est pas d'ordre rhétorique : toutes les quatre lettres ont retrouvé des emplois après retraite comme chiffres grecs. À divers moments, digamma et stigma ont représenté 6; koppa a déjà été 90 et sampi 900. Des années plus tard, les mathématicien.nes ont aussi trouvé un rôle pour digamma : $\digamma(z)$ est la dérivée logarithmique de $\Gamma(z)$; c'est-à-dire, $\Gamma'(z)/\Gamma(z)$. De plus, des fonctions étaient définies pour trigamma, tétragamma, etc. : elles sont parfois représentées par des lettres qui ressemblent plutôt à des portemanteaux.

L'usage de $\sum$ et de $\prod$ pour les sommes des produits est plutôt simple. Mais que dire de $\coprod$ qu'on utilise pour les coproduits? Il semble y avoir une longue histoire, commençant au XIXe siècle quand Peano a introduit U et ∩ pour l'union et l'intersection. Russel, de sa part, a introduit « v » pour « ou » en 1908 (probablement du « vel » en latin.) Il a indiqué « et » par un point – soulignant sa ressemblance formelle à la multiplication, mais non sa dualité de Morgan avec « ou ». Ce n'était qu'on 1930 que Heyting a introduit « $\wedge$ » pour indiquer « et », soulignant la ressemblance entre l'opération et l'intersection d'ensemble. Et bien sûr, avec l'avènement de la théorie des catégories, l'extension de son usage comme symbole de produit inversé pour une union disjointe était presque d'une évidence. Or il semble y avoir une coïncidence quelque part dans ce processus. Peano n'a sûrement pas inventé le symbole ∩ pour ressembler à π.

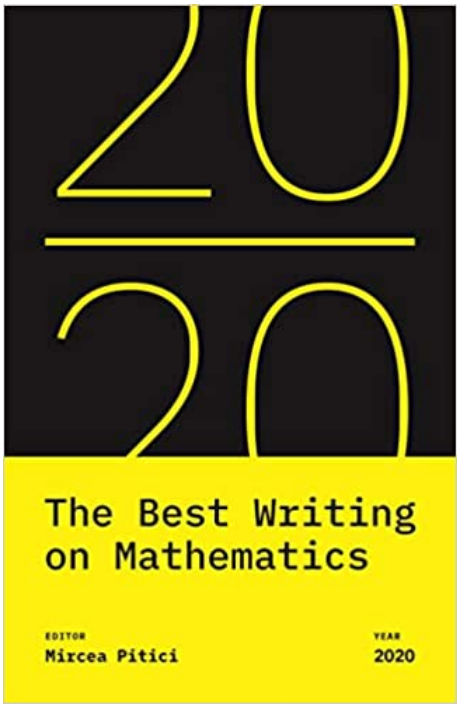
J'ignore la morale de toute cette histoire. Mais c'est mieux qu'écrire encore une autre histoire sur la COVID.

Portez-vous bien!

Karl Dilcher

Book *Reviews bring interesting mathematical sciences and education publications drawn from across the entire spectrum of mathematics to the attention of the CMS readership. Comments, suggestions, and submissions are welcome.*

Karl Dilcher, *Dalhousie University (notes-reviews@cms.math.ca)*



The Best Writing on Mathematics, 2020

Edited by Mircea Pitici
Princeton University Press, 2020
ISBN: 978-0-691-20756-8

This is the eleventh volume in a remarkable series of annual anthologies. Earlier in this space I addressed some general features shared by all volumes. I will not repeat these remarks here; the interested reader will find it in the September 2019, issue. Instead, I will quote from the overview of this volume and add the titles of the individual articles.

"In a piece eerily reminding us of the current coronavirus health crisis, Steven Strogatz recounts the little-known contribution of differential equations to virology during the HIV crisis and makes the case for considering calculus among the heroes of modern life. [*Outsmarting a Virus with Math*].

"Peter Denning and Ted Lewis examine the genealogy, the progress, and the limitations of complexity theory—a set of principles developed by mathematicians and physicists who attempt to tame the uncertainty of social and natural processes. [*Uncertainty*].

"In yet another example of fusion between ideas from mathematics and physics, Bruce Boghosian describes how a series of simulations carried out to model the long-term outcome of economic interactions based on free-market exchanges inexorably leads to extreme inequality and to the oligarchical concentration of wealth. [*The Inescapable Casino*].

"Stan Wagon points out the harmonic-average intricacies, the practical paradoxes, and the policy implications that result from using the miles-per-gallon measure for the fuel economy of hybrid cars. [*Resolving the Fuel Economy Singularity*].

"Jørgen Veisdal details some of the comparative reasoning supposed to take place in majoritarian democracies—resulting in electoral strategies that lead candidates toward the center of the political spectrum. [*The Median Voter Theorem: Why Politicians Move to the Center*].

"In an autobiographical piece, John Baez narrates the convoluted professional path that took him, over many years, closer and closer to algebraic geometry—a branch of mathematics that offers insights into the relationship between the classical mechanics and quantum physics. [*The Math That Takes Newton into the Quantum World*].

"Erica Klarreich explains how Hao Huang used the combinatorics of cube nodes to give a succinct proof to a long-standing computer science conjecture that remained open for several decades, despite many repeated attempts to settle it. [*Decades-Old Computer Science Conjecture Solved in Two Pages*].

"A graph-based explanation, combined with a stereographic projection, also helped Richard Montgomery solve one of the questions posed by the dynamical system formed by three masses moving under the reciprocal influences of their gravitational pulls, also known as the three- body problem. [*The Three-Body Problem*].

"Chris King, who created valuable online resources freely available to everyone, describes the algebraic iterations that lead to families of fractal-like, visually stunning geometric configurations and stand at the confluence of multiple research areas in mathematics. [*The Intrigues and Delights of Kleinian and Quasi-Fuchsian Limit Sets*].

"In the next contribution to our volume, Jim Henle presents several paper-and-pencil games selected from the vast collection invented by Sid Sackson. [*Mathematical Treasures from Sid Sackson*].

"Dave Linkletter breaks the classic Rubik's cube apart and, using the mechanics of the cube's skeleton, counts for us the total number of possible configurations; then he reviews a collection of mathematical questions posed by the toy—some answered and some still open. [*The Amazing Math Inside the Rubik's Cube*].

"Colin Adams introduces with examples, defines, and discusses several important properties of the hyperbolic 3-manifold, a geometric notion both common to our physical environment and difficult to understand in its full generality. [*What Is a Hyperbolic 3-Manifold?*]

"In a similar geometric vein, with yet more examples, physical models, and definitions, followed by applications, Boris Odehnal presents an overview of higher dimensional geometries. [*Higher Dimensional Geometries: What Are They Good For?*].

"With linguistic flourishes recalling Fermat's cryptic style, James Propp traces the history of two apparently disconnected results in the theory of numbers—which, surprisingly, turned out to be strongly related—and tells us how an amateur mathematician used the parallelism to prove one of them. [*Who Mourns the Tenth Heegner Number?*].

"Patrick Honner works out in several different ways a simple multiplication example to compare the computational efforts required by the algorithms used in each case and to illustrate the significant benefits that result when the most efficient method is scaled up to multiply big numbers. [*On Your Mark, Get Set, Multiply*].

"Ben Orlin combines his drawing and teaching talents to prove that ignorance of widely known mathematics can be both hilariously ridiculous and academically rewarding! [*1994, The Year Calculus Was Born*].

"Donald Teets's piece is entirely concerned with the young Karl Friedrich Gauss's contribution to the history of the Christian calendar. [*Gauss's Computation of the Easter Date*].

"Paul Thagard proposes five conjectures (and many more puzzling questions) on the working of mathematics in mind and society and formulates an eclectic metaphysics that affirms both realistic and fictional qualities for mathematics. [*Mathematical Knowledge and Reality*].

"Mark Colyvan asserts that explanation in mathematics—unlike explanation in sciences and in general—is neither causal nor deductive; instead, depending on the context, mathematical explanation provides either local insights that connect similar mathematical situations or global answers that arise from non-mathematical phenomena. [*The Ins and Outs of Mathematical Explanation*].

"Gerry Hahn, Necip Doganaksoy, and Bill Meeker call (as they have done over a long period of time) for improving statistical inquiry and analysis by using new tools—such as tolerance and prediction intervals, as well as a refined analysis of the role of sample size in experiments. [*Statistical Intervals, Not Statistical Significance*]."

This volume ends, as usual, with a book list of other recently published notable writings. The next volume, The Best Writing on Mathematics, 2021, is due to appear in the Spring of 2022.

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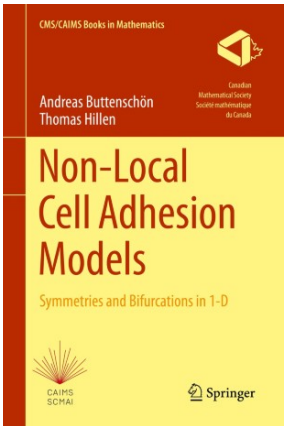
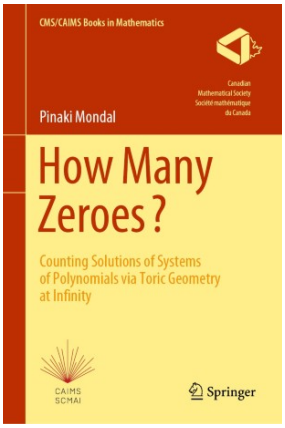
The two titles featured in this column are the first volumes in the new CMS/CAIMS book series, which succeeds the previous "CMS Books in Mathematics". Full reviews of both volumes will be published in due course; therefore, just the publisher's descriptions are given here.



Non-Local Cell Adhesion Models
Symmetries and Bifurcations in 1-D

by Andreas Buttenschön and Thomas Hillen
CMS/CAIMS Books in Mathematics, Springer, 2021
ISBN: 978-3-030-67110-5

Publisher's description: "This monograph considers the mathematical modeling of cellular adhesion, a key interaction force in cell biology. While deeply grounded in the biological application of cell adhesion and tissue formation, this monograph focuses on the mathematical analysis of non-local adhesion models. The novel aspect is the non-local term (an integral operator), which accounts for forces generated by long ranged cell interactions. The analysis of non-local models has started only recently, and it has become a vibrant area of applied mathematics. This monograph contributes a systematic analysis of steady states and their bifurcation structure, combining global bifurcation results pioneered by Rabinowitz, equivariant bifurcation theory, and the symmetries of the non-local term. These methods allow readers to analyze and understand cell adhesion on a deep level."



How Many Zeroes?
Counting Solutions of Systems of Polynomials via Toric Geometry at Infinity

by Pinaki Mondal
CMS/CAIMS Books in Mathematics, Springer, 2021
ISBN: 978-3-030-75173-9

Publisher's description: "This graduate textbook presents an approach through toric geometry to the problem of estimating the isolated solutions (counted with appropriate multiplicity) of n polynomial equations in n variables over an algebraically closed field K. The text collects and synthesizes a number of works on Bernstein's theorem of counting solutions of generic systems, ultimately presenting the theorem, commentary, and extensions in a comprehensive and coherent manner. It begins with Bernstein's original theorem expressing solutions of generic systems in terms of the mixed volume of their Newton polytopes, including complete proofs of its recent extension to affine space and some applications to open problems. The text also applies the developed techniques to derive and generalize Kushnirenko's results on Milnor numbers of hypersurface singularities, which has served as a precursor to the development of toric geometry. Ultimately, the book aims to present material in an elementary format, developing all necessary algebraic geometry to provide a truly accessible overview suitable to a second-year graduate students."

Leslie Shayer (UBC Okanagan)

Education Notes bring mathematical and educational ideas forth to the CMS readership in a manner that promotes discussion of relevant topics including research, activities, issues, and noteworthy news items. Comments, suggestions, and submissions are welcome.

John McLoughlin, *University of New Brunswick (johngm@unb.ca)*
Kseniya Garaschuk, *University of Fraser Valley (kseniya.garaschuk@ufv.ca)*

One of the greatest and controllable influences on math success is math anxiety – a field of study which surfaced over 50 years ago when researchers identified individuals who were "emotionally disturbed in the presence of mathematics" (Dreger & Aiken, 1967, p. 344). Researchers in the field, primarily with psychology or education backgrounds determined that:

1. Math anxiety affects math performance: the greater the anxiety, the lower the score in the math-related course, leading to greater math anxiety and then an even lower score (Hembree, 1990; Ma, 1999; Namkung et al., 2019, Sonnert et al., 2020). Phew! I feel dizzy.
2. Math anxiety leads to math avoidance: students with math anxiety deny themselves a future in math-related fields, such as science, technology, engineering, and mathematics (STEM, Ashcraft, 2002; Hembree, 1990; Mighton, 2020; Namkung et al., 2019; Perry, 2004; Tobias, 1993). Perhaps, more importantly, these students shun mathematics in everyday life, limiting themselves, since math IS everywhere.

Math anxiety has no prejudice – it affects students of all social classes, ethnicities, races, sexes, and genders. There are many causes of math anxiety – from stressful timed tests, to instructor behaviours, to the attitudes of parents/teachers/family/community members, to previous poor math performance, to low competency levels, to socio-economic status. However, today, dear CMS *Education Notes* reader, let us focus on positives and appreciate things that might help.

I posited in my Master's thesis (Shayer, 2020) that math anxiety can be decreased for all students via the incorporation of contemplative practices while taking math courses. Contemplative practices include exercises based on reflection or introspection, which offer a variety of techniques, such as breath awareness, meditation, and visualization.

Now before getting into greater details, let us just begin by taking a deep breath. *In… Out…* You feel better already, right? In fact, Brunyé et al. (2013) determined that focused breathing minimized math anxiety, but did not totally undo its effects when test writing. Truth be told, they only investigated one exercise of focused breathing and suggested further work, over a longer period of time. Perhaps then, greater and sustained effects may emerge (as demonstrated with stress and anxiety in learning by Shapiro et al., 2011).

According to Bellinger et al. (2015), who examined the relationship between math anxiety and mindfulness levels, the more mindful the individual, the less math anxious they were in high stakes testing environments – timed tests, final exams, or any evaluation worth a lot of marks or could decide entrance to careers. Furthermore, Ashcraft and Kirk (2001) considered the drop in working memory – the memory which is used to break problems down into steps or to remember studied procedures – that math-anxious students suffer when test writing, depleting valuable resources to recall methods or to process steps toward a solution. Bellinger et al. (2015) shared that "individuals who received mindfulness training, and extensively practiced, did not show this drop in working memory" (p. 124), leading to their higher performance. Notice the expression "extensively practiced". Evidence demonstrates that regular practice is important for continued benefits (Hyland, 2016; Shapiro et al., 2011).

To support students taking mandatory first-year, university transfer math courses, I devised a program (further detailed in Shayer, 2020), entitled *Mindful Math*, which incorporated evidence-based practices emanating from Mindfulness-Based Stress Reduction (MBSR, a program created by Kabat-Zinn, 1994, the father of the secular mindfulness movement) and smartEducation (an MBSR-style program for pre-service and in-service teachers) curricula. This out-of-class support did not offer tutoring. Instead, the six 45-minute length sessions featured various contemplative practices. The Mindful Math sessions offered a means to observe the impact of contemplative practices on the perceived anxiety of students enrolled in these first-year mandatory math courses. The first three sessions occurred on a weekly basis, whereas the last three were offered biweekly to allow participants time to develop their own practice.

The three most popular (and helpful according to the participants) were:

1. The Pause Practice (involving focused breathing)
2. The 5-4-3-2-1 Practice
3. The Math Class Visualization

The first practice, the Pause Practice, involved taking three intentional deep breaths, focusing on the inhale and the exhale of each (see Figure 1).

Then, participants were invited to ponder their thoughts, sensations, and feelings. The practice ended with three more deep breaths.

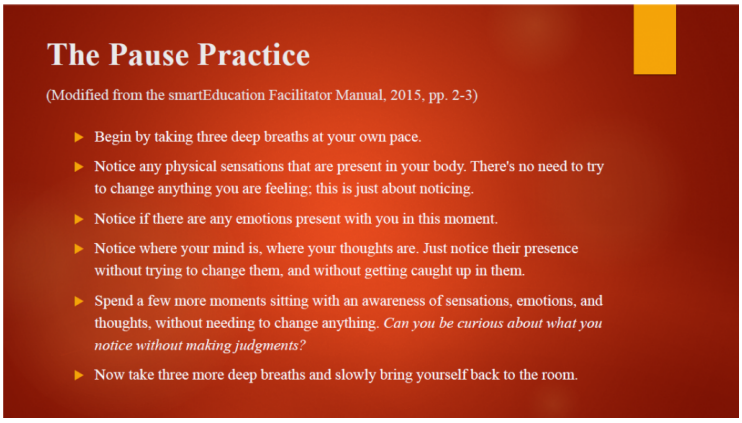


Figure 1. The Pause Practice

Side Note: See the excerpt from the field notes from Session 1 (Figure 2), when the Pause Practice involving focused breathing was first introduced. This description in the excerpt was the first presentation of Number-Induced Math Anxiety, when mere numbers make people feel anxious or react physiologically, as predicted by Namkung et al. (2019). Other such episodes occurred during that first session. In consequence, I steered cleared of counting and of saying "one", "two". Instead, "in" and "out" were used.

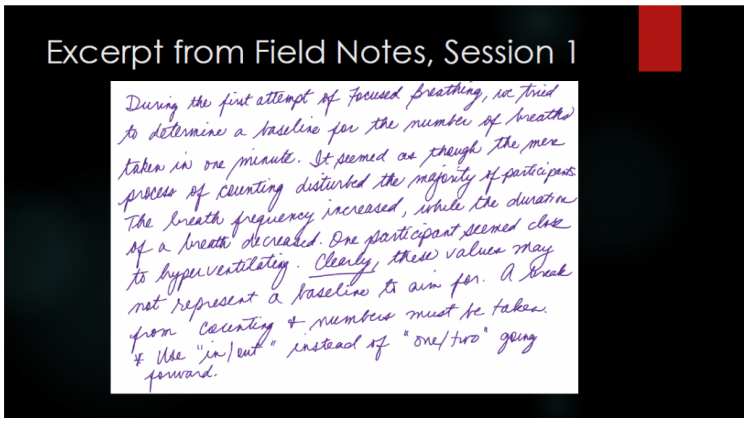


Figure 2. Excerpt from Field Notes, Mindful Math Session 1

I delayed the introduction of the 5-4-3-2-1 Practice due to the presence of numbers; however, by the fourth session, the participants' willingness to engage with it was noticeable. In the end, the 5-4-3-2-1 Practice is an excellent grounding exercise. It quickly became a participant favourite as it is easy to do anywhere and does not require a large time commitment (see Figure 3, 5-4-3-2-1 Practice). As always, you can start and finish with three deep breaths.

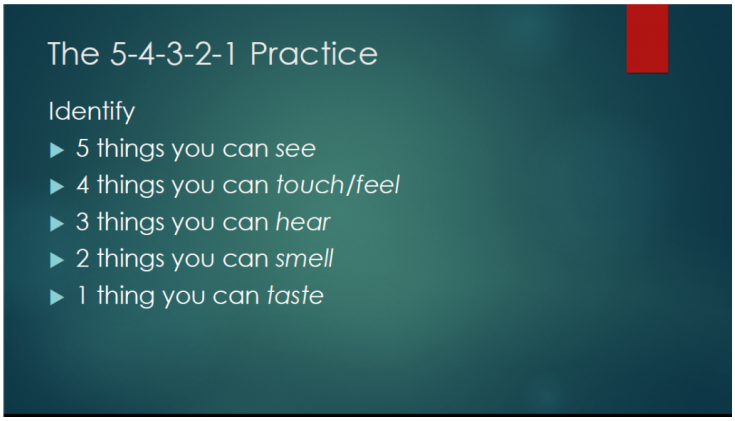


Figure 3. The 5-4-3-2-1 Practice

Finally, one participant felt more at ease in the class after practising visualizations. In consequence, they were more apt to ask questions when they did not understand or ask the instructor for help. The Math Class Visualization was a guided visualization beginning and ending with three deep breaths. It involved the description of a regular student classroom, along with its sights, smells, and sounds. At every instance where anxiety would start to increase (such as when the instructor entered, discussed a difficult topic, or mentioned an upcoming test, or when fellow students would discuss the ease or difficulty of the homework), I would remind the participants that they had done all that they could, that they had done all their homework and that they could manage. Extra deep breaths were had. Positive, yet realistic outcomes were visualized – passing a test, understanding a concept (eventually), problems becoming more manageable with practice, feeling more comfortable asking questions in class or during office hours. As it is a longer practice, please consult Shayer (2020) for the step-by-step visualization.

The case study results also demonstrated that with regular practice over the span of nine weeks, participants were able to manage their math anxiety, all while demonstrating better control of their emotional reactions to math.

I believe that math anxiety is a "chicken or the egg scenario". We can easily get hung up in discussions relating to how math anxiety starts or the best age to squash it. However, those discussions do not lead to solutions. It is never too late to affect change. No matter which grade you teach, whether you have children or adult learners, it is worth a try. Plus, math anxiety is interconnected with many things, from job opportunities, to self confidence, to happiness in life.

Hence, if contemplative practices CAN decrease self-perceived math anxiety, then many ripples can occur, including decreases in math avoidance and increases in math performance. As Tobias (1993) wrote, decreasing math anxiety increases math self-confidence and greater confidence in life in general. Why not give our students the ability to have greater confidence in their lives and in themselves?

Update: I am continuing to work with these ideas now in my Ph.D., incorporating the practices into the classroom itself. Interested readers are encouraged to contact me with questions or comments.

Leslie has been an educator all her life, whether it be as a piano teacher, gymnastics coach, or math instructor. She obtained her master's in applied math in 1998, which led her to the post-secondary classroom experiences. For over twenty years, she has seen students struggle with the very subject that she loves. Leslie returned to graduate school in 2018 to not only complete an M.A. in education, but is currently working on her Ph.D. at UBC Okanagan under the supervision of Dr. Karen Ragoonaden. Her research investigates how contemplative pedagogy may be used to improve the learning of mathematics by decreasing math anxiety.

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Notes de la SCHPM

Février 2022 (tome 54, no. 1)

Prof. David Bellhouse (Western University)

CSHPM Notes bring scholarly work on the history and philosophy of mathematics to the broader mathematics community. Authors are members of the Canadian Society for History and Philosophy of Mathematics (CSHPM). Comments and suggestions are welcome; they may be directed to either of the column's co-editors:

Amy Ackerberg-Hastings, *Independent Scholar (aackerbe@verizon.net)*
Hardy Grant, *York University [retired] (hardygrant@yahoo.com)*

William Playfair (1759–1823) was a man of contradictions. On one hand, he was known as a good statistician and economist. He pioneered the use of statistical graphs and made substantial contributions to the first posthumous edition of Adam Smith's *Wealth of Nations* [12]. He was also one of the first to formulate a theory of how wealthy nations decline and fall [8]. On the other hand, he participated in criminal activity that resulted in his spending a few months in jail. When pressed for money, he engaged in a variety of scams to make ends meet. A lawyer representing one of Playfair's intended victims called him "a daring worthless fellow." (See, for example, [13].)

Playfair's dual nature carried over to his greatest statistical accomplishment, his graphs. On the positive side, graphs provide an easy way to digest complex information. On the negative side, graphs can be an intentional font of misinformation, a convincing depiction of alternate facts. Even when their creators do not intend to be misleading, graphs are only as good as the data going into them. Makers might not know they are using a bad data set, or they may be too lazy to obtain good data. Playfair's graphs exhibited all of these positive and negative characteristics.

Most of his constructions were motivated by his attempts to illustrate economic issues in a simple and understandable way. For example, he invented the bar chart to illustrate the size of imports and exports of various trading partners with Scotland. He is best known among statisticians for two types of specialized graphs: (1) his unique time-series charts related to English trade and its surplus or deficit; and (2) displays of multivariate data that compared a number of statistics for several European countries. Playfair also invented the now ubiquitous pie chart to illustrate the relative sizes of various states and territories of the United States. Here I will present three of Playfair's innovative graphs and comment on what motivated them, as well as their good and bad features. A full account will be given in my forthcoming book, *The Flawed Genius of William Playfair: The Story of the Father of Statistical Graphics*, to be published by University of Toronto Press.

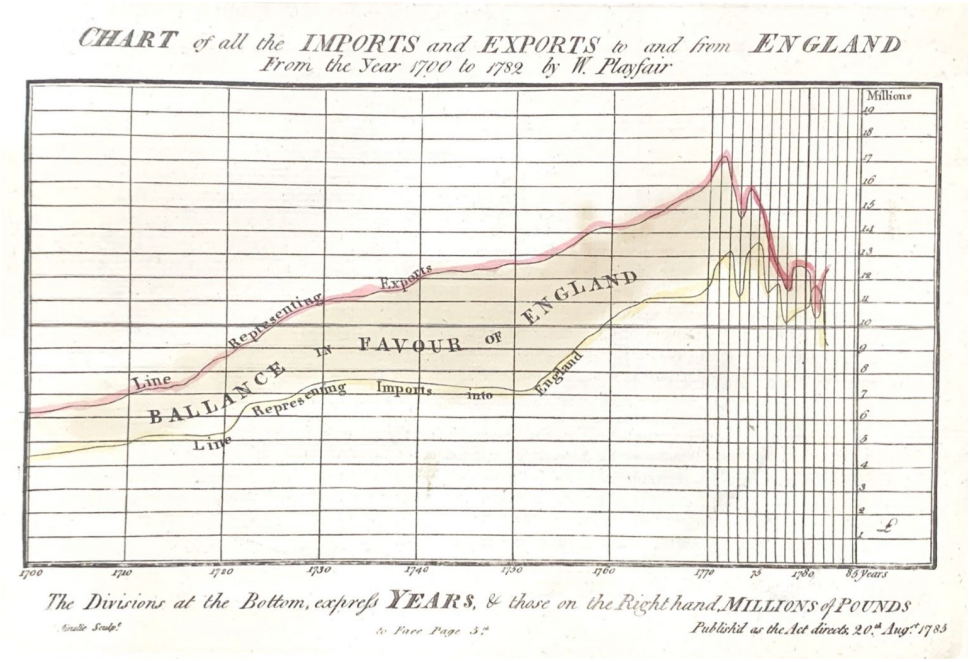

Figure 1. Total Exports and Imports for England 1700–1783.
Image courtesy of Stephen M. Stigler, Chicago.

One of Playfair's early innovations was his use of comparative time-series plots. Several of these graphs appear in his 1786 *Commercial and Political Atlas* [6]. The graph in Figure 1 shows the total amount of exports from England and the total amount of imports, all valued in pounds sterling. The coloured area between the lines shows the trade surplus or deficit. Why this was important had to do with the gold standard. Bank of England pound notes were then backed by gold. Gold was flowing out of England in order to pay for wars in Europe and then America and then Europe again. Gold flowed into England because of the trade surplus. As can be seen in the graph, the surplus had shrunk over time, so that by the end of the American Revolution trade was in a deficit position. Playfair saw this as a problem to be addressed.

Playfair's graphs stand out when compared to others of his day because he used elements that have now become standard. For example, Playfair pioneered the use of colour in his graphs, when colour was rarely used in the printing process. Also, in Figure 1 the plot is framed with the title placed outside the frame. Room is left inside the frame for labels and axis values. Grid lines have been added for ease in reading the chart. All of these elements provide a pleasing appearance. A thorough discussion of Playfair's use of graphical elements can be found in [3].

A feature that particularly stands out for me in the graph in Figure 1 is the way the volatility in the data changes near the end of the series. Further, the gridlines are placed closer together during the period when there is more volatility. This raises a question: Did Playfair smooth his data in some way? In order to answer this question, it is necessary to get at the original data. Playfair gives the data only by decade. In some late-18th-century and early-19th-century publications [4; 15], I found yearly data from 1697 for imports and exports drawn from the Custom House records. I took the yearly data and smoothed the years 1700 through 1770 using a modern technique called LOESS, while the years 1771 through 1782 were left unsmoothed. The result is shown in Figure 2. I have also inserted Playfair's data into the graph to show how closely my smoothed data come to his. While my smoothing does not exactly replicate Playfair's, it comes fairly close. Of course, he did not have this technology. My conjecture is that Playfair used a draftsman's spline to smooth his data. This spline is made of flexible wood which can be bent into curved shapes that are held in place by weights.

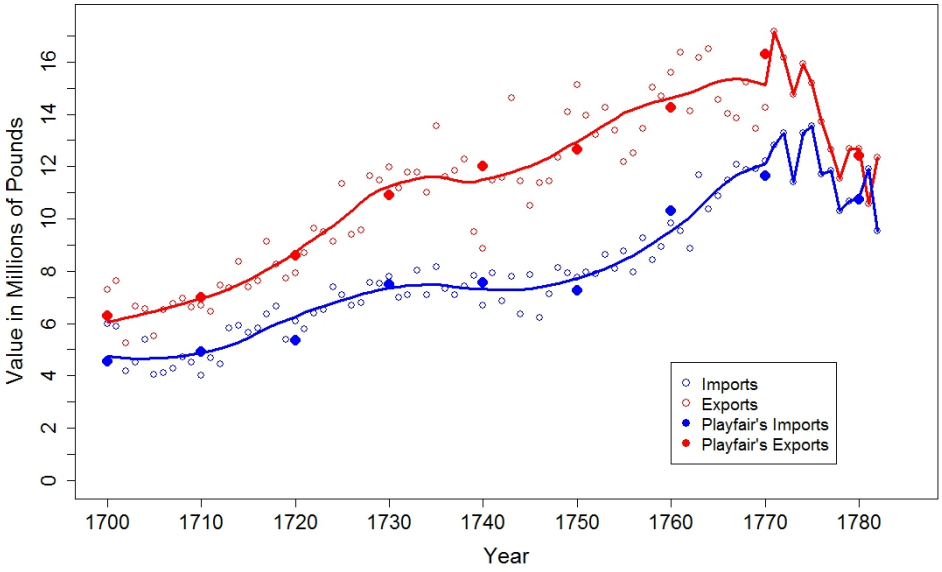

Figure 2. Total Exports and Imports for England 1700–1783, Original and Smoothed Data. Graph drawn using the R software by the author.

Ten years prior to the creation of Playfair's graph, Adam Smith in his *Wealth of Nations* [11] questioned the accuracy of the value of the goods in the Custom House records. This reminds us of the adage that a graph is only as good as the data going into it. If we make a reasonable assumption that the bias in the Custom House records is constant over time and between exports and imports, then Playfair's graph provides a good look at the trends over time, particularly the trend in the trade surplus.

It often happens that peace following war is accompanied by an economic depression. Such was the case in Britain at the end of the Napoleonic Wars in 1815. Some of the hardest hit were factory workers in the cotton mills in the north of England. As a result, there were calls to repeal the corn laws. These were tariffs imposed on the import of grain in order to support the income of the landowners, the upper class of English society. Since the French Revolution, Playfair had supported these landowners as the natural ruling class. He was afraid of the democracy that he had seen evolve in France. Thus he argued against repealing the corn laws and claimed that wages were rising with the price of bread.

Playfair supported his questionable claim with the graph in Figure 3, taken from [9]. Here he has smoothed the data by calculating 25-year averages for the price of a quantity of wheat in shillings. He then calculates the number of days' wages it would take a "good mechanic" to purchase this wheat, as shown by the green bars in the graph. The price of the wheat is given by dotted lines in each of the bars. When the dotted line for price is higher than the days' wages, he colours the difference as a red bar on top of a green one. The vertical axis in the graph stands for both the number of days' wages and the price of wheat in shillings. As can be seen from this graph, although the cost of wheat in shillings was generally increasing over the time period, the number of days' wages required to buy that wheat is decreasing. Consequently, Playfair would say, any criticism of the corn laws va-

nishes.

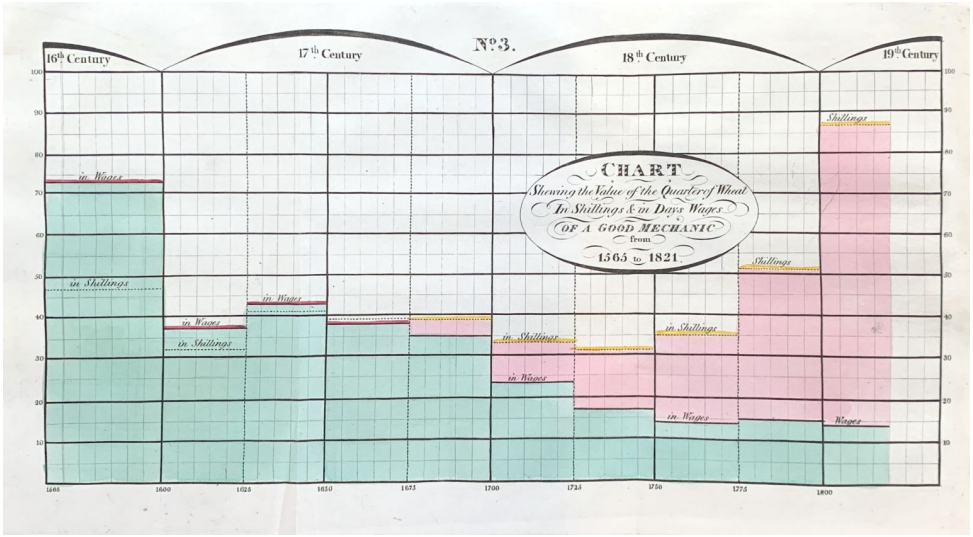

Figure 3. Cost of Wheat in Shillings and the Number of Days' Wages to Purchase the Wheat. Image courtesy of Stephen M. Stigler, Chicago.

The graph is pure propaganda designed to support the landowners. What Playfair meant by the phrase "good mechanic" was "artisan" or "skilled craftsman". Generally, wages for this group had in fact been rising. In that sense, the graph was accurate. But this group was quite different from the factory workers, whom Playfair had completely ignored. Their wages were on the decline and causing them hardship since the cost of bread, the workers' main food source, was rising substantially with the cost of wheat. This situation caused general unrest among the working class, making the government fearful of a revolution such as had occurred in France.

As mentioned earlier, Playfair invented the pie chart. An anticipation appears in his 1801 *Statistical Breviary* [7]. In terms of an actual pie chart, Playfair was not fully aware of what he had done at that point. His fully-fledged pie chart, which appeared in 1805 in his *Statistical Account of the United States of America* [10], is shown in Figure 4. In this book, Playfair claimed to have newly invented the pie chart. The graph shows the fractions of the whole taken up by various states and territories of the United States in 1805. One can easily see, compared to the existing states, the relative sizes of the Louisiana Purchase, the recently-acquired western territories and parts of Florida. However, if you look closely, Playfair made some errors. For instance, he mixed up New York and New Jersey. Further, the data he used were questionable. I compared the areas of various states given in the graph to a map of the United States from about 1805 [1]. The areas don't match up. Sitting in England with little money and possibly in prison, Playfair did not have the resources to obtain a U.S. gazetteer. Instead, he relied on a book, *Éléments de statistique* [2], that had been sent to him by its author, Denis-François Donnant. In addition to a translation into French of *Statistical Breviary*, the book contains a large amount of material on the United States. For each state, Donnant gives the length and breadth of the state. What Playfair did was to multiply the two measurements together to get a state's area, ignoring the fact that the states were not rectangular.

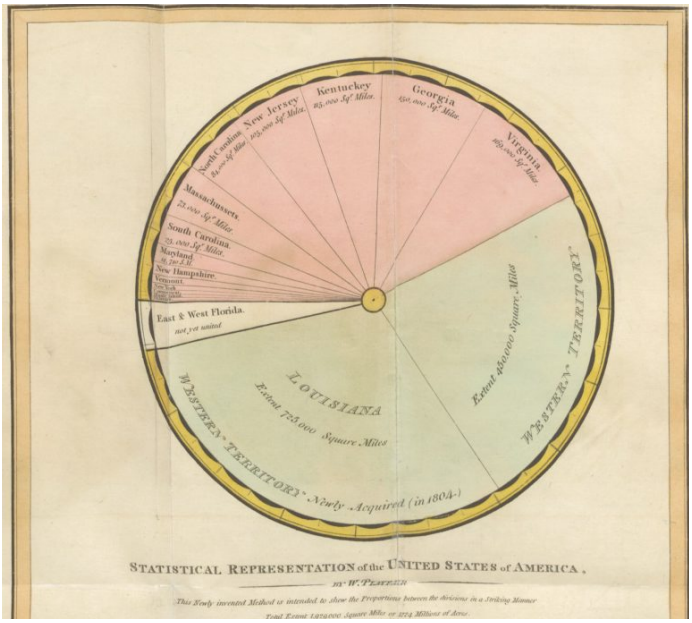

Figure 4. The Relative Sizes of the States and Territories of the United States.
Image courtesy of the British Library.

The pie chart is widely used and misused today. Its severest critic is Edward Tufte [14], one of the modern pioneers of data visualization. He wrote, "The only thing worse than a pie chart is several of them." In qualified support of pie charts, the eminent pedagogue of statistics David S. Moore suggests that they can be used to emphasize a group's relation to the whole [5]. Such is the case with Playfair's pie chart.

These are only three examples chosen from the dozens of graphs that Playfair produced during his lifetime, but they give a fair representation of the work he did. Over the past two hundred years, Playfair's work has sometimes been neglected or forgotten, corresponding to the ebb and flow of interest in statistical graphics. With the advent of new methods of data visualization via computers, interest in Playfair's work has picked up substantially. Reflecting this trend, in 2010 a copy of his *Commercial and Political Atlas* sold at Christie's auction house for $43,750 USD. Despite some of the shortcomings that I have mentioned, he laid a solid foundation for good graphical procedures.

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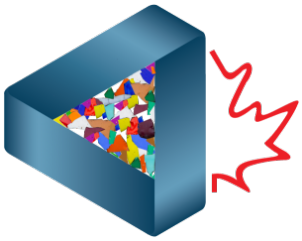
Habiba Kadiri



MOSAIC est une chronique dirigées par le Comité ÉDI de la SMC qui porte sur l'équité, la diversité et l'inclusion au sein de la communauté mathématique. Vos commentaires et suggestions sont les bienvenues

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In this article we hope to explain why the CMS needs to collect data about the status of diversity across the mathematical community at large.

What is the role of the CMS-EDI committee?

One of the first duties for the Executive Committee is "to take appropriate action to ensure diversity throughout the Society". The CMS EDI committee was created in Summer 2020 to support the Executive Committee in this effort. Since then, it has organized discussions and scientific sessions during each semi-annual meeting, and it has also created a new column, MOSAIC, in the CMS Notes. These initiatives open long awaited spaces for mathematicians to express themselves and share their experiences as members of underrepresented groups. They also provide a space for EDI champions to share their wisdom in building a more inclusive community.

The specific mandate of the CMS-EDI committee includes "to ensure that conferences are accessible and welcoming to all groups", "to monitor the position and interests of women in mathematics, those with disabilities, LGBTQ+ communities as well as other underrepresented groups in Canada and in the Society", and "to recommend actions to the Board of Directors which will assure equitable treatment of these groups in the mathematical community." [1]

Some initiatives have already been undertaken using the experiences of other research communities; for instance, to help session organizers of the CMS meetings select a more diverse panel of speakers, the committee has advised replacing the invitation system with an open call one. We hope this system will be in place by Summer 2022. To determine if this initiative is effective would require some quantitative measures.

Collecting data to take appropriate action to ensure diversity throughout the CMS

As of today, the CMS does not collect or at least share any aggregated data about its meeting participants. More generally, there is a lack of data at all levels of CMS activities. Understanding if and where problems exist and identifying practical solutions require data about the circumstances of the mathematical community. In this article, we would like to highlight various reasons why collecting data is essential to fulfill the CMS mandate and to support the mathematical community:

1. We can measure our position relative to the national (funding agency) mandate;
2. We can measure the extent to which the CMS meets its own mandate;
3. We can identify biases in how the CMS characterizes excellence, and specifically how it recognizes the outstanding contributions of its membership and community;
4. We can start to assess whether the mathematical spaces we support are welcoming and safe for all participants.

One of the first tools that the EDI-Committee is building to start understanding some of these questions is a **nation-wide survey.**

1. **We need data to measure our position relative to that of the national (funding agency) mandate.**

During the November 2017 Gender Summit in Montreal, Dr. Mona Nemer, Chief Science Advisor of Canada, stated that "increasing the number and impact of women and other members of underrepresented groups in STEM requires the concerted efforts of our entire society—including governments, scientific organizations, research granting agencies, and educational institutions".
Dr. Nemer also added that "using the same thinking and approaches—including criteria, metrics, policies and procedures for hiring and recognition at

all levels—will not lead to change."[2]

NSERC's need to initiate change arose, in part, from a 2006 Settlement Agreement with the Canadian Human Rights Commission. The settlement addressed a complaint concerning the underrepresentation of individuals from four designated protected groups in the Canada Research Chairs (CRC) Program. The four groups were comprised of (women, Indigenous peoples, persons with disabilities and members of visible minorities). With successive addendums until 2019[3], the Federal Court has required the government to implement targets and to use data to set and enforce said targets. The CRC program is required to achieve the following representation rates by 2029[4]:

Women	Visible Minorities	People with Disabilities	Indigenous
50.9%	22%	7.5%	4.9%

The program now has public accountability and transparency requirements as well as penalties in the event of non-compliance[5]. As of October 2021, the Representation of members of the above four designated groups among the NSERC's CRC[6] was:

Women	Visible Minorities	People with Disabilities	Indigenous
30.2%	26.2%	5.3%	0.8%

Completing the self-identification questionnaire is mandatory; however, all questions provide an option to select "I prefer not to answer". Understanding why collecting this data is important and how it informs EDI initiatives is clearly communicated by NSERC[7][8]. In 2018, a relatively low rate of 5.7% "I prefer not to answer" shows that applicants understand and are willing to provide self-identification information[9]. Since then, the CRCC self-identification questionnaire was revised in 2020 as the 2019 Addendum required revisions to collect data regarding LGBTQ2+ communities. Considering the fundamental partnership between granting agencies and mathematicians, one expects the CMS to have a vested interest in upholding these commitments. While it is in a privileged position to monitor the status of underrepresented groups in mathematics, the CMS does not yet appear to collect any data. Thus, it is difficult to have an accurate picture of the situation. In the meantime, with information readily available, such as participant lists, one can make estimates concerning women as it is a category one can identify with a marginal error.

2. **We need data to measure the extent to which the CMS meets its own mandate.**

Over the last thirty years, the majority of the Canadian population has been female[10]. Over 40% of graduates in mathematics and related studies are women at both the Bachelor and Master level. This rate drops to about 30% at the PhD level (2019 Stats Canada[11] and 2021 NSF[12] reports). We are giving here a first account of the participation of women in the various CMS activities during the past year. These numbers are not official ones and should not be referred to as they have been compiled based only on the information found on the CMS websites.

CMS Boards	**Women**
Board of governors [13]	37%
Editorial boards [14] Canadian Journal of Mathematics Canadian Mathematical Bulletin Crux Mathematicorum	 24% 25% 47%
CMS Winter meeting 2021 [15]	
Participants	32%
Speakers	35%
Organizers of a scientific session	49%

While these participation numbers align with the rate of PhD's in mathematics, a closer study of the participation numbers at the last CMS meeting reveals some discrepancies in the representation of women depending on the scientific sessions. For example, none of the 8 education, EDI, and Indigenization themed sessions had less than a 20% female speaker rate, and only one had below 30%. On the other hand, among the other 24 scientific sessions, there were 2 below 10%, 8 below 20%, and 12 below 30%. In the context of an online conference, these numbers can be considered disappointing as the pool of potential speakers is less restricted by geography, financial means, or logistics, such as parental duties. More systematic data collection would allow us to clarify the situation and better assess the need for specific policies in the organizer handbook.

3. We require data to identify biases in how the CMS characterizes excellence.

The following table summarizes data collected from the CRCC report[16].

	Women	Visible Minorities	People with Disabilities	Indigenous
Canada Graduate Scholarships–Master's	62%	20.1%	4.4%	2.3%
NSERC Postgraduate Scholarships	41.6%	27.8%	3.4%	1.8%
NSERC Postdoctoral Fellowships	42.4%	41.6%	-	-
NSERC Discovery Grants	23.9%	23.0%	1.4%	0.6%
Canada Research Chairs	38.6%	21.4%	5.5%	3.2%

Note that the CGSM and the CRC's numbers are for the Tri-Agencies.

In addition, a rapid assessment of the Chairholders database[17] indicates that roughly 21% of CRC's in mathematics are held by women.

The following table presents the frequency of some Canadian awards for women in mathematics since their inception, and its evolution over the past 10 years. The numbers below are not official ones and should not be referred to as they have been compiled based only on the information found on the CMS Awards website[18].

Awards	Women (since beginning)	Women (since 2012)
Fellowship of the CMS [19] (since 2018)	11.8%	11.8%
David Borwein Distinguished Career Award [20] (since 2006)	0%	0%
Graham Wright Award for Distinguished Service [21] (since 1995)	10.3%	20%
Adrien Pouliot Award [22] (since 1995)	14.3%	20%
Excellence in Teaching Award [23] (since 2004)	16.7%	20%
Coxeter James Prize [24] (since 1978)	4.5%	0%
Jeffery-Williams Prize [25] (since 1968)	1.9%	0%
CMS Blair Spearman Doctoral Prize [26] (since 1997)	7.7%	0%
G. de B. Robinson Award [27] (since 1995)	15.4%	27.3%
CRM-Fields/CRM-Fields-PIMS Prize [28] (since 1995)	7.4%	10%

The CMS fellowship was created in 2018 to acknowledge "contributions to the profession and to the Canadian mathematical community" and "to support the advancement of mathematicians to leadership positions within their own organisations and the broader society". We note a significant discrepancy between the rate of women recognized via this fellowship and the rate of women contributing to the CMS board of governors or to the organization of sessions at the CMS meetings.

We note that during the past 10 years, the rate of awards recognizing excellence in mathematics has not increased in half the awards or prizes, namely the David Borwein Distinguished Career Award, the Coxeter James Prize, the Jeffery-Williams Prize, and the CMS Blair Spearman Doctoral Prize. In addition, none of them has been awarded to a woman in the past 10 years.

Even though 30% of math PhD graduates and 42.4% of NSERC PDF recipients are women (among whom a positive proportion of mathematicians), none of them was recognized with a Blair Spearman Doctoral Prize.

In the end, all the numbers are below 21% which is roughly the proportion of women CRCs in mathematics.

The table does not show the Krieger-Nelson prize which has specifically targeted female mathematicians since 1995. We note that this award does not seem to have leveraged the profile of its recipients the way other CMS prizes do have: many recipients have received several awards while only one Krieger-Nelson prize recipient received another Canadian award.

Finally, we note that the CMS does not have any other form of celebration for the contributions to mathematics from other underrepresented groups in the discipline.[29] There is also no explicit mention of contributions to EDI taken into consideration in the selection of the recipients.

As universities and NSERC have made commitments to rectify biases against underrepresented groups, we are left wondering how they reconcile with using the CMS accolades in the evaluation or promotion process.

The following table looks at the representation of women among the ICM speakers[30] affiliated with Canada, in comparison to those affiliated with France and the United States of America. The choice of these two countries is justified by being Fields Medallist leaders together with Canada's main research partner countries.

Country	**Women (from beginning)**	**Women (since 2010)**
Canada (since 1912)	1/46 = 2.18%	1/12 = 8.32%
France (since 1897)	33/387 = 9.04%	14/55 = 25.45%
United States (since 1900)	50/727 = 6.88%	17/106 = 16.04%

Canadian representation at the ICM has been subject to gender imbalance, far more than have France and the USA. We note one Canadian female speaker at the ICM since 1912. This number can grow to 3 by allowing consideration of dual citizenships.

The next International Congress of Mathematicians will take place this summer in Saint Petersburg, Russia. Because of Russia's list of human rights abuses (political prisoners include a student mathematician, repression of opponents, including students and faculty, discrimination of LGBT people, etc), mathematicians around the world have called for a boycott[31] of the event. At the very least, the CMS will need to publicly acknowledge these valid concerns raised by the mathematical community about the situation in Russia in relation to ICM 2022.

4. **We need data to assess whether mathematical spaces are welcoming, and safe for all participants.**

According to a 2019 Statistics Canada survey on students' experiences of discrimination based on gender, gender identity or sexual orientation at post-secondary schools[32], 20% of women students experienced discrimination, versus 13% of their male colleagues. Discrimination was also more common for LGBTQ+ students who reported twice the rate of heterosexual students, at 31% versus 15%.

There is testimonial evidence that math students and math conference participants have upsetting or distressing experiences. However, there is limited quantitative data available in the context of the CMS formalized. In November 2018, the CMS officialised its Code of Conduct[33] and included it in the registration process for its meetings as of December 2021. It is however not clear whether the code has any real substance, as the number of incidents is not recorded. Data about STEM more generally indicates a need for action. To understand if any initiative to make math spaces more welcoming and more safe can be effective, we will need to collect data specific to our community.

Conclusion

There is limited information regarding the status of underrepresented groups in the Canadian mathematical community. The current information gathered shows clear disparity between the rate of participation and the rate of recognition for women in mathematics. We can only assume a similar phenomenon is happening for other equity seeking groups. Only the regular collection of self-identification data will allow us to monitor the diversity of participants and to design new measures that achieve greater equity, diversity, and inclusion. Currently, our Society seems behind common practices that our funding agencies, our universities, and our international partners have already put in place to partially compensate biases against underrepresented groups.

This year, the CMS is launching an inaugural EDI survey to get an overview of the diversity of Canadian mathematicians and to understand the experience of underrepresented groups in mathematical spaces. The relevance of this survey depends on a large buy-in, so we hope you will participate and will encourage all of your mathematical contacts to do so as well.

Notes

[1] CMS Terms of Reference Standing Committees and Editorial Boards.
https://www2.cms.math.ca/Docs/Terms/terms2020-07.pdf

[2] Speech of Dr. Mona Nemer, Chief Science Advisor of Canada, at the Gender Summit, Montréal, Québec (November 7, 2017).
https://www.ic.gc.ca/eic/site/063.nsf/eng/h_97755.html

[3] 2019 Addendum to the 2006 Canadian Human Rights Settlement Agreement.
https://www.chairs-chaires.gc.ca/program-programme/equity-equite/2019_addendum-eng.aspx

[4] Table 10, Canada Research Chairs Program Statistics.
https://www.chairs-chaires.gc.ca/about_us-a_notre_sujet/statistics-statistiques-eng.aspx

[5] Canada Research Chairs Administration Guide
https://www.chairs-chaires.gc.ca/program-programme/admin_guide-eng.aspx#consequences

[6] Table 4, Canada Research Chairs Program Statistics:
https://www.chairs-chaires.gc.ca/about_us-a_notre_sujet/statistics-statistiques-eng.aspx

[7] Self-identification data collection in support of EDI.
https://www.ic.gc.ca/eic/site/063.nsf/eng/h_97615.html

[8] NSERC Framework on Equity, Diversity and Inclusion.
https://www.nserc-crsng.gc.ca/NSERC-CRSNG/EDI-EDI/framework_cadre-de-reference_eng.asp

[9] Canada Research Coordinating Committee 2018-19 Progress Report: Strengthening Canadian Research.
https://www.canada.ca/en/research-coordinating-committee/services/publications/progress-reports/2018-2019/annex-1-self-identification-data-collection.html

[10] Female population – Stats Canada.
https://www150.statcan.gc.ca/n1/pub/89-503-x/2010001/article/11475-eng.htm#a2
[11] Persistence and Representation of Women in STEM programs – Stats Canada.
https://www150.statcan.gc.ca/n1/pub/75-006-x/2019001/article/00006-eng.html

[12] Women, Minorities, and Persons with Disabilities in Science and Engineering – NSF report:
https://ncses.nsf.gov/pubs/nsf21321/report/field-of-degree-women#mathematics-and-statistics

[13] https://cms.math.ca/about-the-cms/governance/

[14] https://cms.math.ca/publications/

[15] https://winter21.cms.math.ca/

[16] Canada Research Coordinating Committee 2020-2021 progress report.
https://www.canada.ca/en/research-coordinating-committee/services/publications/progress-reports/2020-2021.html

[17] NSERC's Awards Database
https://www.nserc-crsng.gc.ca/ase-oro/index_eng.asp

[18] https://cms.math.ca/awards/

[19] "For excellent contributions to mathematical research, teaching, or exposition; as well as having distinguished themselves in service to Canada's mathematical community."

[20] "To recognize individuals who have made exceptional, broad, and continued contributions to Canadian mathematics."

[21] "To recognize individuals who have made sustained and significant contributions to the Canadian mathematical community and, in particular, to the Canadian Mathematical Society."

[22] "To recognize individuals or teams of individuals who have made significant and sustained contributions to mathematics education in Canada."

[23] "To recognize sustained and distinguished contributions in teaching at the post-secondary undergraduate level at a Canadian institution."

[24] "To recognize young mathematicians who have made outstanding contributions to mathematical research."

[25] "To recognize mathematicians who have made outstanding contributions to mathematical research."

[26] "To recognize outstanding performance by a doctoral student who graduated from a Canadian university in the preceding year."

[27] "To recognize the publication of excellent papers in the CJM and CMB and to encourage the submission of the highest quality papers to these journals."
We count the number of articles (co)-authored.

[28] http://www.fields.utoronto.ca/honours-and-fellowships/crm-fields-pims-prize

[29] Elbert Frank Cox was the first African American to receive a PhD in mathematics co-supervised by Lloyd Williams, co-founder of the CMS.
https://cms.math.ca/about-the-cms/inclusive-mathematics/

[30] Plenary and Invited Speakers of the International Congress of Mathematicians (ICM)
https://zenodo.org/record/1976747#.YdlyfyxlBpQ
Speakers with multiple known citizenships are not counted.

[31] Boycott ICM 2022 in Russia.
http://www.icm2022boycott.org/

[32] Students' experiences of discrimination based on gender, gender identity or sexual orientation at postsecondary schools in the Canadian provinces, 2019:
https://www150.statcan.gc.ca/n1/pub/85-005-x/2020001/article/00001-eng.htm

[33] CMS Code of Conduct:
https://cms.math.ca/wp-content/uploads/2020/02/CMS-Code-of-Conduct-Jan-2019.pdf

Appel de candidatures

Nous sollicitons la candidature de personne ou de groupe de personnes ayant contribué d'une façon importante et soutenue à des activités mathématiques éducatives au Canada. Le terme « contributions » s'emploie ici au sens large; les candidat.e.s pourront être associé.e.s à une activité de sensibilisation, un nouveau programme adapté au milieu scolaire ou à l'industrie, des activités promotionnelles de vulgarisation des mathématiques, des initiatives spéciales, des conférences ou des concours à l'intention des étudiant.e.s, etc.

La SMC a pour but de promouvoir et de célébrer la diversité au sens le plus large. Nous encourageons fortement les directeurs et les directrices de département et les comités de mise en candidature à proposer des collègues exceptionnel.le.s sans distinction de race, de genre, d'appartenance ethnique ou d'orientation sexuelle.

Les mises en candidature doivent parvenir au bureau de la SMC avant le 30 avril 2022. Veuillez faire parvenir votre mise en candidature par voie électronique, de préférence en format PDF**,** à **prixap@smc.math.ca.**

Conditions de candidature

- Inclure les coordonnées des candidat.e.s ainsi que des présentateurs et des présentatrices.
- Décrire en quoi le et la candidat.e a contribué de façon soutenue à des activités mathématiques. Donner un aperçu de la période couverte par les activités visées et du succès obtenu. La description ne doit pas dépasser quatre pages.
- Le dossier de candidature comportera deux lettres d'appui signées par des personnes autres que le présentateur ou la présentatrice.
- Il n'est pas nécessaire d'inclure des curriculums vitae, car les renseignements qui s'y trouvent et qui se rapportent aux activités éducatives visées devraient figurer sur le formulaire de mise en candidature et dans les autres documents énumérés ci- dessus.
- Veuillez indiquer si la candidature a été soumise l'année précédente.
- Les membres du Comité d'éducation de la SMC ne pourront être candidat.e.s pour l'obtention d'un prix pendant la durée de leur mandat au Comité.

Renouveler une mise en candidature

Il est possible de renouveler une mise en candidature présentée l'année précédente, pourvu que l'on en manifeste le désir avant la date limite. Dans ce cas, le présentateur ou la présentatrice n'a qu'à soumettre des documents de mise à jour puisque le dossier original a été conservé.

2021 Adrien Pouliot Award Recipient

Joseph Khoury
University of Ottawa

Joseph Khoury est le plus récent récipiendaire du prix. Veuillez lire le communiqué de presse. Pour une liste des ancien.ne.s lauréat.e.s et pour lire leurs citations, veuillez visiter la page officielle du Prix Adrien-Pouliot.

En 1995, la Société mathématique du Canada a créé un prix pour récompenser les personnes qui contribuent de façon importante et soutenue à la communauté mathématique canadienne et, notamment, à la SMC. Ce prix était renommé à compter de 2008 en hommage de Graham Wright pour ses 30 ans de service comme Directeur administratif et secrétaire de la SMC.

La SMC a pour but de promouvoir et de célébrer la diversité au sens le plus large. Nous encourageons fortement les directeurs ou les directrices de département et les comités de mise en candidature à proposer des collègues exceptionnel.le.s sans distinction de race, de genre, d'appartenance ethnique ou d'orientation sexuelle.

Pour les mises en candidature prière de présenter des dossiers avec une argumentation convaincante incluant trois lettres de support et de les faire parvenir, **le 31 mars 2022 au plus tard**.

Veuillez faire parvenir tous les documents par voie électronique, de préférence en format PDF, avant la date limite à **prixgw@smc.math.ca**.

Renouveler une mise en candidature

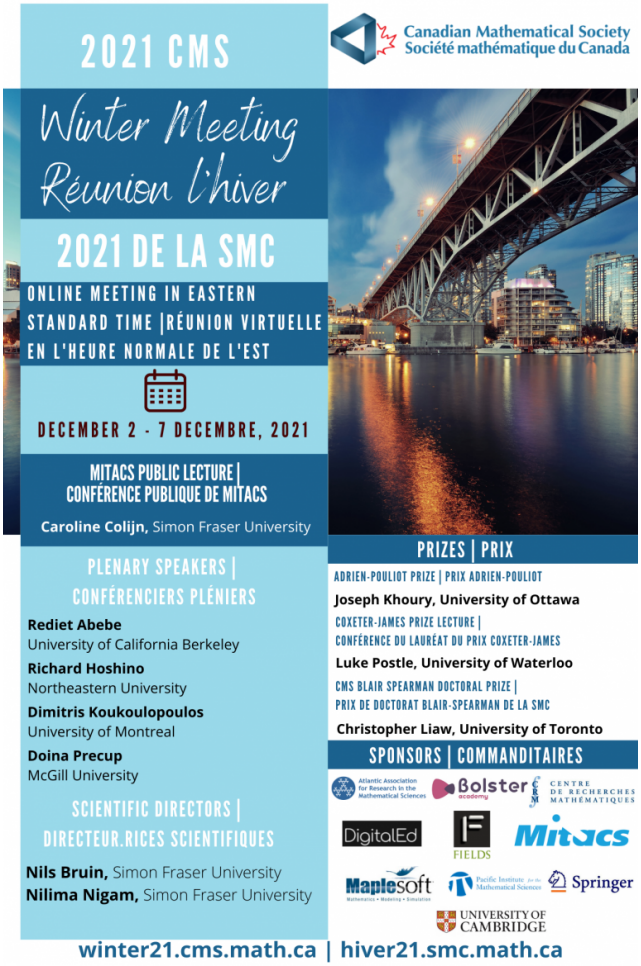
Il est possible de renouveler une mise en candidature présentée l'année précédente, pourvu que l'on en manifeste le désir avant la date limite. Dans ce cas, le présentateur n'a qu'à soumettre des documents de mise à jour puisque le dossier original a été conservé.

Récipiendaire du Prix Graham-Wright pour service méritoire en 2021

Kseniya Garaschuk
University of the Fraser Valley

Kseniya Garaschuk est le plus récent récipiendaire du prix. Veuillez lire le communiqué de presse. Pour une liste des anciens lauréats et pour lire leurs citations, veuillez visiter la page officielle du Prix Graham-Wright pour service méritoire.

Jessica Wallace



Bonne année! La SMC a accueilli 600 mathématicien.ne.s à sa Réunion virtuelle d'hiver qui a eu lieu du 2 au 7 décembre. Cela a été la quatrième réunion virtuelle de la SMC. Les participant.e.s ont pu assister à plus que 30 sessions scientifiques, à quatre conférences plénières; à deux conférences de lauréat.e.s et à une conférence publique durant les 5 jours de la Réunion. Les conférenciers.ères plénières étaient : Richard Hoshino (Northeastern University); Doina Precup (McGilll University); Rediet Abebe (University of California Berkeley) et Dimitris Koukoulopoulos (University of Montreal).

La SMC a également offert des mini-cours de trois heures le jeudi 2 décembre. Le trois mini-cours offerts étaient les suivants : un cours gratuit d'introduction à la programmation Maple; introduction à l'autosimilarité; et introduction à la modélisation des maladies infectieuses après la vaccination.

À la fin de la journée de jeudi, la SMC a organisé une conférence plénière délivrée par Caroline Colijn (Simon Fraser University) intitulée « Mathematics and the pandemic : des populations aux inividus ».

La réunion a toutefois eu son ouverture officielle vendredi après-midi avec les mots de bienvenue du Président de la SMC Javad Mashreghi.

Le comité d'étudiant.es de la SMCS (StudC) a tenu un cocktail virtuel pour offrir aux étudiant.e.s la chance de réseauter dans une ambiance non universitaire allégée par des activités de brise-glace, et des jeux mathématiques.

Dans le cadre de la Réunion, Nicholas Fillion et Martiza Branker ont organisé une table ronde le mardi 7 décembre. La discussion portait principalement sur les femmes en histoire des mathématiques.

La Réunion d'hiver 2021 a aussi offert aux participant.es l'occasion de réseauter avec leurs pairs et les individus avec qui iels partagent les mêmes intérêts dans les forums virtuels et pendant des évènements sociaux.

Il ne nous a pas été possible de tenir la cérémonie de prix comme d'habitude, mais la SMC a reconnu les lauréat.e.s 2021 des prix de la SMC pendant la cérémonie d'ouverture et les lauréat.e.s ont aussi préparé un court exposé. Les lauréat.es 2021 des prix de la SMC sont comme suit : Joseph Khoury (Ottawa) lauréat du prix Adrien-Pouliot, Luke Postle (Waterloo) lauréat du prix Coxeter-James qui a aussi présenté une communication sur la conjecture de Hardwiger, Christopher Liaw (Toronto) lauréat du prix de doctorat Blair Spearman de la SMC a présenté une communication intitulée « Optimal anytime regret with two experts », et Kseniya Garashuk (Fraser Valley) lauréate du prix Graham Wright.

Le prix de meilleure présentation par affiche d'AARMS-SMC a aussi été présenté pendant cet évènement virtuel. Les gagnant.es sont : le prix AARMS à Benoit Corsini (McGill University) pour son affiche intitulée "Local minimum spanning tree optimization"; prix du comité d'étudiant.es de la SMC à Tian Wang (University of Illinois Chicago) pour son affiche intitulée « On the Effective Version of Serre's Open Image Theorem »; et le Prix du Président de la SMC à Gavin Orok (Waterloo University) pour l'affiche intitulée « Patterns in Higher-Dimensional Electron Domain Geometries ».

Organiser une réunion de cette envergure prend beaucoup de dévouement et du travail acharné. Cette réunion n'aura pas été possible sans les efforts du comité d'organisation scientifique, les directeur.rice.s scintifiques, les organisateur.rices des sessions et le personnel de la SMC. Les directeur.rices scientifiques Nils Bruin (Simon Fraser University) et Nilima Nigam (Simon Fraser University) ont œuvré sans relâche pour offrir un grand programme scientifique. Leur dévouement et ouverture ont fait de la réunion d'hiver 2021 un évènement mémorable.

La SMC aimerait reconnaitre le soutien financier de Mitacs, du PIMS, du Fields, du CRMS, de l'AARMS et de MapleSoft.

Jessica Wallace (SMC)
Organisatrice de concours et d'évènements

Bonne année! 2021 fut une année spéciale pour la SMC! En raison de la pandémie mondiale la SMC a dû prendre des décitions difficiles par rapport à ses concours annuels. Les équipes nationales de l'Olympiade européenne de mathématiques pour filles (OMEF) et l'Olympiade internationale de mathématiques (OIM) ont continué à participer à distance. Nous avons également eu un autre cycle réussi des concours de l'automne, le Défi ouvert mathématique du Canada et le Concours mathématique canadien du geai gris (CMCG), visant respectivement les élèves du secondaire et du primaire.

l'Olympiade européenne de mathématiques pour filles

L'OEMF 2021 devait avoir lieu à Kutaisi en Georgie. Or, cette année aussi, elle a été tenue dans un format virtuel en raison de la pandémie de COVID-19. Mariya Sardarli (chef d'équipe) et Elnaz Hessami Pilehrood (chef adjointe) ont entrainé l'équipe canadienne 2021 : Alison Tsypin, Jennifer Wang, Yifan Tang et Kaylee Ji. Anna Krokhine (députée et observatrice) a aussi aidé avec l'entraînement.

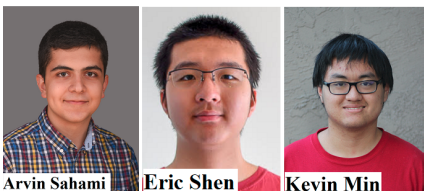
C'était une moment de fierté pour la SMC! Kaylee Ji est devenue la première membre de l'équipe canadienne d'OEMF a remporté une médaille d'or. La Directrice générale de la SMC Termeh Kousha s'est réjouis de ce succès : « C'est une grande victoire pour la communauté mathématiques, pour les filles, pour les stimm et pour la SMC. »

Ancienne chef d'équipe OEMF et présidente du Comité des concours mathématiques de la SMC a aussi salué le travail assidu des participantes, des chefs et des entraineurs qui ont donné de leur temps à l'équipe :

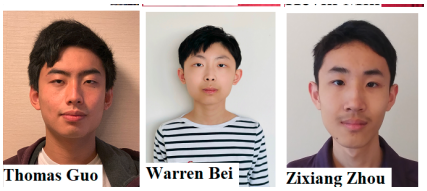
> *« Bien que le concours soit une épreuve individuelle, l'entrainement et la préparation ont été un travail d'équipe. Je me réjouis de la première médaille d'or de l'Équipe OEMF Canada et j'ai hâte de voir ce que chacune des membres fera en poursuivant ses rêves et en explorant ses talents. J'espère qu'elles se sont toutes senties comme des précieuses membres de la communauté mathématique du Canada et du monde. »*

Voir le communiqué pour plus d'information.

l'Olympiade internationale de mathématiques



En raison de la pandémie de la COVID-19, l'OIM s'est tenue virtuellement, à Saint-Pétersbourg. L'équipe canadienne consistaient de : Eric Shen, Thomas Guo, Zixiang (Peter) Zhou, Kevin Min, Arvin Sahami et Warren Bei. Suivant les règles de l'OIM, les participants ont écrit le concours dans les centre d'examen de l'OIM. L'Université de Waterloo a généreusement fourni cet espace aux membre d'équipe. L'équipe canadienne était dirigée par chefs d'équipes et anciens olym-



piens Alex Song (Citadel LLC) et Dani Spivak (Toronto).

La cérémonie d'ouverture a également eu lieu en ligne le 18 juillet et le concours les 19 et 20 juillet aux centre d'examen de chaque pays participant. En raison des restrictions de la santé publique, des amis de la SMC, dont Robert Garbary, ont aidé à surveillé le concours. Félicitations à Eric Shen, à Thomas Guo et à Zixiang Zhou d'avoir remporté la médaille d'or; et à Kevin Min, à Arvin Sahami et à Warren Bei d'avoir remporté la médaille d'argent!

Le coprésident du comité de l'OIM, James Rickards s'est réjoui de ce résultat : « l'OIM 2021 fut un grand succès pour le Canada. C'est seulement la troisième fois que l'équipe math Canada remporte trois médailles d'or, et on en a ajouté trois médailles d'argent. La dernière fois que le Canada s'est classé 5e au monde était en 2012. »

Pour plus d'informations voir le communiqué de presse et le rapport de l'OIM.

Défi ouvert mathématique du Canada

Cette année, la SMC a tissé de nouveaux liens de partenariat avecAsian Math Alliance (AMA) : Singapore; Magic Square: Hong Kong, Macau; MathsRFun: Australia, New Zealand; ainsi qu'avec Transitions Lab Preparatory School en Inde. Les organisateurs.rices était content de participer à un concours canadien et un grand nombre d'élèves participaient pour la première fois à un concours international.

La pandémie n'a pas facilité la tâche pour les enseignant.es cette année. Les écoles participantes avaient la chance de surveiller l'examen et les élèves dont l'école ne participaient pouvaient s'inscrire aux centres d'examen universitaires qui offraient les modes virtuels et en personne. En tout 5197 examens ont été achetés, y compris les livraisons numériques, et 275 qui ont participé en ligne. Les corrections du DOCM ont terminé et les résultats seront annoncés bientôt.

Concours mathématique canadien du geai gris

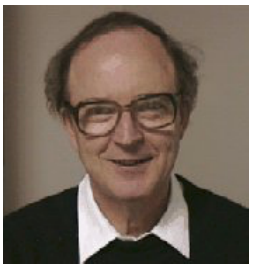
Le nouveau Concours mathématique canadien du geai gris cible les élèves de la 5e à la 8e année mais est ouvert à tou.tes. la CMS a formé le comité du Geai gris avec des mathématicien.nes de partout au Canada pour créer un examen avec 15 questions à choix multiple. En tout, 2793 examens ont été achetés à travers le pays, dont 1970 ont été en ligne et 823 en version papier.

Initiative pour les filles – Combler l'écart

La SMC aimerait remercier la Banque royale du Canada pour son soutien à cette nouvelle initiative. L'objective de l'initiative pour les filles et d'encourager les filles à s'inscrire et à participer aux concours mathématiques. Cette année, la SMC pouvait allouer un nombre limité d'inscriptions gratuites dans le cadre de ce programme. Le résultat a été une hausse de taux de participation de filles.

La SMC a aussi continuer à offrir les inscriptions gratuite aux élèves noir.es t autochtones, ainsi qu'aux élèves s'identifiant comme LGBTQ+ et aux personnes vivant une situation de handicap.

John Grant McLoughlin



Bruce had a profound influence, not only on me, but on many of the people he came in contact with. He will be missed.

We only met in person a handful of times and he always made me feel like a friend and a valued colleague.

Bruce was always kind to me, and he challenged me to do more. I think I'll consider my mathematical career a success if I can measure my positive influence in a fraction of Bruce's positive influence.

I always found him to be calm, and to have a calming presence. I can't recall him being upset, perhaps sometimes slightly exasperated or a bit frustrated with some problem or other, but somehow he always seemed to see them in perspective. I don't know this, but I suspect he asked himself if he would even remember the problem after some time had passed, and decided that he would not, and therefore it was really not that important. It also helped that he had a good sense of humour.

His joy of life and of mathematics clearly shines through whenever one encounters him.

Bruce L.R. Shawyer (12 May 1937 – 21 November 2021) passed peacefully at St. Luke's Homes, St. John's, after a sudden illness. The above quotes from contributors to this piece speak to the person. An effort is made here to offer a tribute to Bruce Shawyer through broadening awareness of his contributions to the mathematical community while offering a wider lens for viewing his life as a mathematician and beyond. Many of the voices appearing in this piece are those of long-time colleagues at Memorial University of Newfoundland (MUN).

As a child in Kirkcaldy, Scotland, during WWII, he discovered a love for Mars Bars, provided by his grandfather, a naval blacksmith who had access to chocolate rations. He was the first in his family to attend university. At the University of St. Andrews, his mentor David Borwein encouraged his interest in mathematics, and Bruce received his PhD in 1963. He taught at the University of Nottingham from 1962-1966, where he met his beloved wife Jo. In 1966 they moved to Canada for a six month visit that extended 55 years. Bruce taught at the University of Western Ontario (1966-1985) and Memorial University (1985-2002) prior to being named a Professor Emeritus of Mathematics at MUN in 2004.

Bruce Watson had an unusual take on Bruce Shawyer's experience in Canada, as reflected in his words here:

> *Bruce moved to St. John's in 1985 to take up the position of head of the Department of Mathematics and Statistics at Memorial University. But I had known him since the 1966-67 academic year. Soon after arriving from the UK as a new faculty member at Western University, Bruce was assigned to teach the complex half of the third-year honours course Real and Complex Analysis. I was an undergraduate student in that class. Two years later I became a graduate student of David Borwein. Bruce had also been a student of David's at St. Andrew's in Scotland. Hence, we were interested in the same sorts of problems.*
>
> *After I was hired by Memorial, Bruce visited the university. He and his wife, Jo, liked the city and university and he later applied for the headship position. During his time at Memorial, besides allowing me to bounce my ideas off him, we collaborated on two books. The first was an Oxford publication entitled Borel's Methods of Summability: Theory and Applications. Bruce's early research work had been on problems in Borel's methods. The other book was volume XI in the CMS's ATOM series called Problems for Junior Mathematics Leagues.*
>
> *Bruce's contributions to mathematics education in Newfoundland and Labrador were extensive. He started the very successful Senior High Math League in St. John's area high schools and later, via the internet, it was expanded to other interested schools in the province. He encouraged me to extend the math league idea to the junior high level when I was acting head in 2000-01. This led to the ATOM book.*

Years earlier in 1987, Bruce Shawyer and Rita Janes established the Newfoundland and Labrador Teachers' Association (NLTA) Senior Math League in St. John's. This league brought together various schools in a common setting, such as a host school or the MUN campus, usually four times annually. The league extended beyond the overpass to regional gatherings across Newfoundland and Labrador. Bruce was a regular attendee at the St. John's games for many years along with Peter Booth as representatives of the math department. Volumes III, VI, and VIII of the ATOM series are *Problems from Mathematics Leagues I, II and III* respectively. These publications along with *Shaking Hands in Corner Brook* offer collections of math league problems prepared by Bruce Shawyer, Peter Booth, and John Grant McLoughlin.

The building of relationship with students and colleagues was significant. David Pike adds, "When I was a junior member of my department, Bruce's

mentorship and advice were always welcome and sage. He was particularly fond of working with undergraduate students and helping to provide them with opportunities, including the annual invitational to his splendid backyard garden."

Bruce was a mentor who touched the lives of many people. Neil and Rebecca McKay are among the math league participants who have gone on to pursue academic careers in mathematics. "Dr. Shawyer largely contributed to both of us ending up in mathematics." As a participant in the *Women in Science and Engineering (WISE)* program, Bruce showed Rebecca the beauty of mathematics (and LaTeX!). Neil states, "Bruce's biggest impact was through the NLTA Senior Math League. The Math League introduced me to collaborative mathematics and to sharing mathematics in a room full of strangers, which I now do professionally." One of the noticeable hallmarks of the league was the high level of participation by women, as supported by the collaborative model with teams of four at tables doing mathematics. The fact that the league continues to flourish 35 years after its inception speaks to the legacy of Bruce's efforts in building a community for mathematical problem solving.

Bruce served as Editor-in-Chief for *Crux Mathematicorum*. Shawn Godin comments on his own experience upon joining Crux to edit the *Mathematical Mayhem* section: "I was intimidated. I had enjoyed *Crux* for years, and was proud when I was able to solve a problem or two from an issue, but I didn't feel qualified to work on it. Bruce was a wonderful mentor, he taught me LaTeX, gave me praise for some of my work and gave me feedback that allowed me to grow without feeling that I was out of place." Later this year a special issue of *Crux* will be dedicated to Bruce Shawyer. The call for contributions is forthcoming in the next month.

Exemplary mentorship was an aspect of his leadership that showed in other ways, as expressed here by Eddy Campbell.

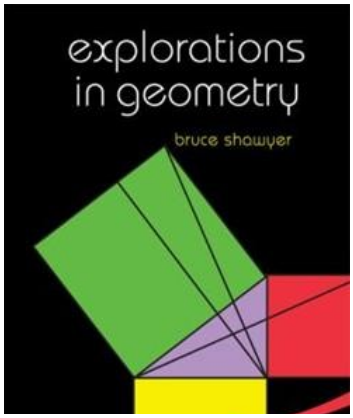
> *In my experience, he was balanced and fair in his work as an administrator. A good citizen, without whom no department, faculty or university can run well or aspire to be great. He cared about teaching—this was really obvious in his work for the CMS—and this, too, is essential for any university, and Memorial benefitted a great deal from his passion for teaching, part of why I use the word balanced. Of course, he understood the importance and value of research, this showed in his work as Head in the hires that he oversaw. Service teaching is the bread and butter of mathematics departments everywhere, it helps if our leaders show that they care and work hard to support it. He also helped nurture undergraduates with his life-long commitment to problem-solving and Crux.*

Bruce Shawyer's contributions to mathematics have been recognized throughout his career. These honours include recognition as a Fellow of the Alexander von Humboldt Foundation. The CMS named him the recipient of the Adrien Pouliot Award in 1996 for his contributions to mathematical education. Recently in 2019 he was named a Fellow of the CMS.

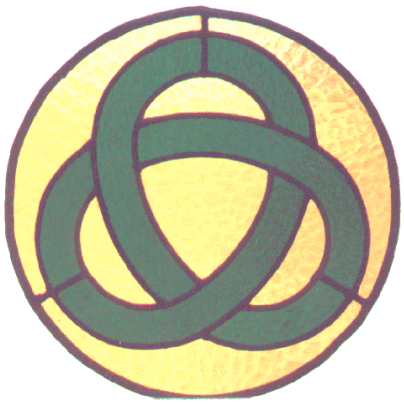
Bruce was a mathematician. His research was in the analytic theory of divergent series. In communications with Jo Shawyer, she wrote:

> *The bottom line is that Bruce enjoyed mathematics every day of his life. And he enjoyed sharing it with others, and demonstrating its excitement to even the most reluctant students. He was particularly fond of geometry and a little sad that it did not have a more prominent place in the curriculum in the years which he taught.*

His publication of a book entitled *explorations of geometry* illustrates his appreciation through a blend of theory and about 200 problems encompassing topics such as basic Euclidean geometry, concurrency and collinearity, constructions, and conic sections. Detailed solutions to problems cover almost 150 pages, thus, making up half of the book. In the preface, Bruce mentions the value of the material to students at secondary school and undergraduate levels with an interest in math competitions. He writes "I have been involved in helping in such events for many years, and still find it such an enjoyable occasion when students are having enjoyment solving mathematical problems." Bruce played an active role in coaching with the *International Mathematical Olympiad* (IMO) and most notably played a critical role in organizing and bringing the IMO to Canada in 1995.



The interests of Bruce Shawyer extended well beyond mathematics. Bruce played the piano his whole life and composed many Scottish and English country dance works. His favorite times in recent years were playing with his bandmates at St. Luke's. His father taught him gardening, and Bruce loved spending time outdoors and hosting garden parties. He also built beautiful things with wood and stained glass.



Bruce actually composed musical pieces for each of my two daughters when they were young in St. John's. Bruce and Jo were such kind people to our family especially when settling into St. John's. Bruce was a mentor as well as being the editor who brought me on board with *Crux* initially to coordinate the book reviews and subsequently to participate with *Mayhem* problem selection and so on. Bruce was also the Chair who vetted me to teach MUN's first year math courses in Labrador Community College in the early 1990's. The opportunity to collaborate with him on books and math leagues added to our professional connections, and visits to his home and the wonderful gardens were always a delight.

An amusing memory concerning Bruce occurred in 1998 in his absence. Bruce and Jo commonly went to the UK in May. Imagine the surprise when a person arrived in the department looking for Bruce having travelled from the UK. This person had come for the CMS Meeting in St. John's. We had to break the news that the Shawyers were in the UK and that he was a year early for the meeting. People really went out of their way to visit Bruce!

Bruce's spirit of hospitality and kindness was further reflected through opening a family home to immigrant families needing a place to stay, to Polish defectors during the Cold war, to Miranda Leather whom he loved like a daughter, and to numerous others who were always welcome at holiday meals. Bruce is loved by his sister Elma MacIntyre (Bill), his wife Jo, his children Janet Rowe (Glen), Andrew Shawyer (Molly), Anna Shawyer, Susanne Shawyer (Tony), granddaughter Amanda Shawyer and Miranda Leather (Chris).

In closing, the words shared by Edgar Goodaire offer further insight into why many of us feel fortunate to have had our journeys cross paths with Bruce Shawyer.

> *I think often of the early days. It is important to note that Bruce was the first Memorial Head of Mathematics/Statistics who was not a native Newfoundlander and natural friend of those who worked for him. There is no doubt that some were skeptical, even anxious,*

but these feelings did not last for long. I have never met a couple who defined «social» as did Jo and Bruce Shawyer. Almost immediately, they began hosting dinners. I'll bet there was not a member of the department who hadn't been invited over to the house. I was fortunate to have been there on many occasions. The children were chefs and waiters. For some reason, I was usually the designated wine server! Boy, what a great guy. Great person, friend, colleague, leader, citizen.

Acknowledgments:
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