Seeing Mathematics in the World

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This past year the world turned upside down. Students that were in the room before were suddenly far away, and colleagues on the other side of the world were now only a click away. Home life and work life collided as schools, communities, and nations struggled to reduce the rate of infection. For many people, this forced a quick introduction to the mathemathics of viral infection. The mathematics learned here was stark: get enough people vaccinated (or socially distanced) to move past a phase transition that would deny a virus exponential growth or face the consequences.

As the COVID-19 pandemic changed our society, it also changed mathematics. In this issue, we introduce a new thematic set of articles: Math in the Time of COVID. We also bring you a poetry folder devoted to work reflecting the realities and the experiences of this pandemic.

COVID-19 forced many to understand the mathematical realities of a pandemic, but in fact, mathematics has always been an integral part of the world around us. Sometimes it is so ingrained that it is overlooked. The focus of many of the articles in the rest of this summer issue is on mathematics that is present in our environment, in our myths, our literature, our games, our music, and our culture.

Veselin Jungic starts us down this path with an article on the ideas of infinity found in a Haida myth. Paolo Mancosu then takes us through correspondence between the great logician Alfred Tarski and the biologist Joseph H. Woodger motivated by Woodger's attempts to put biology on an axiomatic footing.

Siddhi Desai, Brianna Kurtz, and Farshid Safi explore ways to help students construct and strengthen their mathematical identities by looking for mathematics in their own cultures in areas beyond the school topics.

Uffe Jankvist, Helle Rørbech, and Jesper Bremholm discuss curricular connections and possible synergies between mathematics and literature. Next Anthony DeLegge and Ellen Ziliak describe a course built around games can give even math majors a new perspective on mathematics. Ilana Shapiro and Mark Huber then take us into the world of music and show us how Markov chains are the latest in a long tradition of mathematically generated music. Finally, in the last standard article of the issue, Frode Sirnes Larsen brings us into the world of visual arts and shares with us the many ways that Raphael placed Leonardo da Vinci and his ideas in his landmark painting *School of Athens*.

Next comes our thematic section: Math in the Time of COVID. Larson Fairbairn, Kameelah Jackson, and Ksenija Simic-Muller discuss their experience of supplementing a geometry course for preservice K-8 teachers with art projects. Matilde Lalín brings us a story of number theory research mixed with her (and many other parents') new reality of homeschooling.

Richard Delaware reflects on the memories that came up during the pandemic, while Rachel Epstein, Caroline Haddad, Emek Kose, and Melissa Sutherland look at gendered inequalities in the pandemic response. Beyza Aslan tells how combining mathematics with crocheting skills learned in her youth helped her through the lockdown.

Times of crisis can make us reconsider the status quo. Pricilla Bremser reflects on how her thoughts on grading practices changed radically over the course of the pandemic.

Then Zoe Austin and Jennifer Austin tell us the amazing story of Math Girl saving the day. And in the final article in this eclectic thematic folder, Lawrence M. Lesser recounts early attempts to teach exponential growth to children and adults.

Starting off our World of Mathematics section, Nat Banting considers the question of turning mathematics learning into a verb rather than merely a collection of nouns. Bruce Pourciau brings us a list of proverbs that encourage mathematical thinking in the calculus classroom.

Next, Clara Ziskin, Esther Williams, and Alla Shmuckler take us on a tour of the book *Amazing Tales From the Magic Wood and Famous Problems of Mathematics* by Ziskin and Shmuckler. Wyatte Hooper takes us through two very different proofs (from Archimedes and Newton) involving the quadrature of a parabola and puts them together productively.

Marshall Gordon presents the argument that students should first learn the heuristic method of problem solving before the elegant (but unnatural) methods that are often taught in courses.

Many are unaware that famed topologist Felix Hausdorff was also a poet. Benjamin Joseph Elkins offers us a translation of one of his many poems displaying clearly his human spirit. Igor Podlubny then gets to the heart of the eternal equation of the creative content of mathematics in his lost chapter of *The Little Prince*.

The Activity contribution in this issue comes from Manmohan Kaur, who playfully turns the cryptographic Sherlock Holmes story *The Dancing Men* into a stimulating class unit for students.

In our Memories & Remembrances section, Milton Rosa and Daniel Clark Orey offer a personal tribute to Ubiratan D'Ambrosio, the father of ethnomathematics, who passed away this May at the age of 88. We know his life and his work will continue to inspire us for many more years to come.

There are two Perspectives in this issue. In the first, James Propp warns of the dangers of putting students into the genius box of mathematics. In the second, Heidi Goodson and Alnna Hoyer-Leitzel argue that the assumptions in crime hotspot models perpetuate systemic racism in policing.

Our first poetry folder comes from Lowell Abrams, who shares with us his poetic explorations of mathematical rigor. The second poetry folder consists of reflections inspired by the pandemic. The poets who contributed to this folder are, in alphabetical order, Christopher Caruvana, Marion Cohen, Lawrence M. Lesser, Dan May, Vanessa Sun, and Michele R. Willman.

Next come poems by Michael Leach, Mary Soon Lee, Bruce McGuffin, Oscar Gonzalez, and Cacey Wells. Jonah Howell gives us a fictional piece written in the form of a series of letters from a troubled narrator reflecting on the last days of logician Kurt Gödel. Then Sarah Glaz and Mark Sanders share a poem-collage pair created during the pandemic.

The coronavirus gets its name from the Latin *corona*, meaning crown. Bonnie Jacob and Jobby Jacob give us a light-hearted interview with the corona graph, a mathematical object which has nothing to do with that other recent phenomenon.

We close this issue with the announcement of the Fourth VOICES Conference on Teaching STEM with Song, which will be September 26, 2021.

We hope you will enjoy this wide-ranging summer issue, and share it with friends, family, students, and colleagues.