Letters to the Editor

The "Pythagoras" Game

In March 1997, the *Notices* carried an interview with B. L. van der Waerden conducted by Yvonne Dold-Samplonius on May 4, 1993. In the interview, van der Waerden says the following:

"I had a game called 'Pythagoras'. It consisted of pieces which could be moved around freely and with which it was possible to construct a square or rectangle or a triangle by combining them in a variety of ways. I received it as a present, and I played with it most happily."

I would like to know the details of the game. I wrote to Yvonne Dold, who replied that:

"At the time of the interview with van der Waerden I vividly imagined this game, called Pythagoras, to consist of geometrical shapes with the same unit of measure executed in Mondrian colors, like the toy building blocks. So I never questioned him about it. I called his eldest daughter, Helga Habicht, and asked her about the game. However, the game is not part of family history, it is completely unknown to her."

I wonder if any *Notices* readers are familiar with the game. I understand that *Notices* Editor Magid would welcome a letter to the editor explaining "Pythagoras".

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Remembering George Mackey

In response to the reports on George W. Mackey in the *Notices*, I would like to say how he decisively influenced my research for four decades.

In April 1967, I gave an invited talk to the British Mathematical Colloquium (Swansea) on a new groupoid version of the traditional van Kampen theorem for the fundamental group of a pointed space. At tea time, I was told: "That was very interesting. I have been using groupoids for years. My name is Mackey."

He then told me of his work on groupoids and ergodic theory. It occurred to me that if people from two or three different areas found the idea of groupoid significant, then there was probably much more in this than I had previously thought.

An immediate effect was for me to add a chapter on covering spaces to the book on topology which I was writing, since Mackey used strongly the action groupoid of a group action.

When I came to Bangor in 1970, I set students to work on topological groupoids (Lew Hardy) and measured groupoids (Tony Seda). Eventually, Tony's thesis was on Haar measure for groupoids, and later Mackey told me he also had a student working on this!

The replacement of groups by groupoids allowed for higher homotopy groupoids, and their applications, as structures in some sense "more noncommutative" than groups (or groupoids).

It was only in 1981 that I learned from Jean Pradines, and began to understand, Charles Ehresmann's extensive work on Lie groupoids, and their applications to local-to-global problems.

Though we met only a few further times, Mackey's conceptual approach to mathematics was an encouraging example in all this. He made his own evaluations of potential importance. In his field, he followed Dirac's dictum: "You should follow a mathematical idea wherever it leads…", and was undistracted from this by what is called "the mainstream". He was truly a professional.

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Promoting Mathematics to the Public

My take on the "applications" issue is this. I have my students ask strangers questions like "What's the quadratic formula?" and "If a train leaves New York doing 50 mph and another…". First, they're strangers. And second, when the person gets home, they'll say to themselves "Holy cow, I've actually been asked these questions in real life!"

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Machine-checkable Proofs

Bryan Cain voices concerns about the reliability of the research literature ["Letters", August 2007]. One way to address these concerns is to build a public database of machine-checkable proofs of published theorems. Such a database would exist alongside the human-readable literature; the literature would be consulted for insight and understanding, while the database would be consulted to settle disputes about correctness.

We are not yet at the point where producing a machine-checkable version of one's theorems is as easy as producing a TeX document or a C program of comparable length, but we are closer to that point than many might think. There already exist fully machine-checkable proofs of the prime number theorem, the Jordan curve theorem, the Goedel-Rosser incompleteness theorem, and the four-color theorem. Producing machine-checkable proofs is becoming easier and easier. Every mathematician, and the AMS in particular, should seriously think about how to hasten the day when proof-checking can be safely delegated to the computer, freeing humans to spend more time thinking creatively.

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Kramer vs. Cremer

With reference to the very interesting "Memories of Prague" by Lipman Bers,

Bers refers to a paper that Loewner asked him to discuss, the author of said paper also being a "mathematical poet who was also a very talented rhymester". I am wondering whether the person intended to be described thusly was not Cremer, rather than Kramer. Hubert Cremer (1897–1983) did some well-received work in what today is referred to as complex analysis. In Milnor's 1999 notes on complex dynamics, he is, in fact, listed among the founders of complex dynamics. Cremer's book of mathematical poems, *Carmina Mathematica* is famous. The first edition appeared in 1927. I am the happy owner of the 4th printing (Aachen, 1977). Here is an example of the second stanza of a four-stanza poem celebrating the complex variable. This stanza tells how terribly hemmed in the life of a real variable is:

Reelle Variable, wie bist Du beschränkt!
Du kennst keine Sprünge zur Seite,
Und wirst Du mal vorwärts und rückwärts beengt,
Gleich bist Du k. o. dann und pleite!
Du ächzt auf der Achse, Du stirbst auf der Stell,
Must elend versauern—reell, reell.

The joke in the second line, referring to the inability of real numbers to "jump to the side", i.e., off the real axis, is that in colloquial German, "Seitensprung" refers to a short marital infidelity. A real variable is denied even that possibility.

The author of this letter had the privilege of knowing both Bers and Loewner. In a response to a letter that I wrote to Loewner in about 1965 asking him how he liked his new office at Stanford, he answered, "Es kommt nicht auf den Käfig an ob der Vogel singen kann" (Whether or not the bird can sing does not depend on the cage.) How true and how typical of Loewner!

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Review of "A World Without Time"

In his review of my book, *A World Without Time: The Forgotten Legacy of Gödel and Einstein*, John Stachel claims that:

1) In the theory of relativity, time is essentially local, with so-called "proper time" the fundamental concept, and that

a) this conception of time does not clash with pre-relativistic intuitions of time, and that

b) the crucial aspect of local time in relativity is that of process.

2) He also maintains that Gödel fails to advance reasons as to why his cosmological models have physical significance and thus speak to the nature of time in the actual world.

My response is as follows:

3) a) Even if one grants the premise of 1), Stachel gets things precisely backwards in 1) a). Who would deny that if it is 4 p.m. by your watch, it is the same time down the street? And who, absent knowledge of relativity, thinks this question becomes meaningless if it turns out to be a really, really long street?

b) To accept 1) b), one needs to believe in the idea of a process, a progression or lapse of time, that is merely relative. "A relative lapse of time", however, Gödel notes, would mean "a relative change in the existing", whereas, as he puts it, with great force, "the concept of existence…cannot be relativized without destroying its meaning completely."

4) In 2), Stachel ignores the discussion in my book of the "modal" aspect of Gödel's argument. Gödel's point is not that his models apply to the actual world, but rather that:

a) They describe relativistically possible worlds that differ, at most, from our own in the global distribution of matter and motion, and

b) It is conceivable that in such worlds—where time in the intuitive sense is provably absent—people would experience time much as we do.

For Gödel, continued belief in the existence of intuitive time in the actual world is "…not a straightforward contradiction; nevertheless, a philosophical view leading to such consequences can hardly be considered satisfactory."

One can take issue with Gödel's argument, but one cannot, in good conscience, agree with Stachel that Gödel has advanced "not a shred of evidence" concerning the physical and philosophical significance of his cosmology, nor that his reasoning is simply "an example of that fetishism of mathematics, to which some Platonists are so prone."

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Correction

The September 2007 issue of the *Notices* carried an article about the Mathematics Geneaology Project (http://www.geneaology.math.ndsu.edu/), an Internet database of mathematics doctorate recipients and their advisors. The article mistakenly said that David Hilbert was a student of Felix Klein. In fact, Hilbert was a "grandstudent" of Klein: Ferdinand von Lindemann was a student of Klein, and Hilbert was a student of Lindemann. The *Notices* thanks Jan R. Strooker of the Universität Utrecht for pointing out this error.

—*Allyn Jackson*