MATH in the MEDIA

A Monthly Magazine from the American Mathematical Society

Image of the Month

One of many puzzles at the Lilly Library at Indiana University
Photo: Michael Taylor/Lilly Library, Indiana University

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Tony Phillips' Take on Math in the Media

A monthly survey of math news

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This month's topics:

Math: Whale Songs --> Kaleidoscopic Images

A periodic segment of the song of the Minke Whale *Balenoptera acutorostrata*; graphic generated using wavelet analysis; plotted in polar coordinates with time = θ. Aguasonic image by Mark Fischer, used with permission.

"Subtle Math Turns Songs of Whales Into Kaleidoscopic Images" was the headline for a piece in the August 1 2006 *New York Times*, accompanied by four images like this one. Gretchen Cuda tells how Mark Fischer, a California-based former engineer, has been using "wavelets - a technique for processing digital signals - to transform the haunting calls of ocean mammals into movies that visually represent the songs and still images that look like electronic mandalas." Cuda checked with Gil Strang of the MIT Math Department, and reports that wavelets, once relatively obscure, "are being used in applications as diverse as JPEG image compression, high definition television and earthquake research." The song and the video, where the pattern shown above can easily be recognized, are available at Minke-Boing on Google.uk. More from Mark Fischer on his website.

The Poincaré Conjecture on National Public Radio

Listeners to Weekend Edition on Saturday July 29, 2006 were treated to a report by Keith Devlin (the "NPR Math Guy") on recent news of the Poincaré Conjecture. The International Congress of Mathematicians meets this year [other summaries of press coverage begin at right]; rumors have it that one of the Fields medals will be

Math Digest

Short summaries of article about mathematics in the popular press

Recent Math Digest Summaries: *Poste September 2006*

Coverage of 2006 Fields Medals, August 20

The startling announcement that Grigory Perelman turned down the Fields Medal ma 2006 International Congress of Mathemati held in August in Madrid, Spain, into a maj news event. The story of Perelman, a reclu Russian mathematician whose revolutiona work in geometric analysis has confirmed legendary Poincaré Conjecture, transfixed the world over and brought mathematics i newspapers, magazines, web sites, and television and radio broadcasts. In many c the coverage neglected the other three Fie Medalists, Andrei Okounkov, Terence Tao, Wendelin Werner, although the media in th cities where they work and in their home countries (Russia, Australia, and France, respectively) ran stories about them. The presence at the ICM opening ceremonies o King of Spain---who attended to present th Fields Medals to Okounkov, Tao, and Werner---ensured plenty of coverage withi Spanish media. For his part, Perelman sta out of the limelight and was reported by on newspaper to have spent the opening day c Congress watching television. "I do not thi anything that I say can be of the slightest interest," he told the *Telegraph* newspaper know that self-promotion happens a lot anc people want to do that, good luck to them, do not regard it as a positive thing." Some coverage portrayed Perelman as a mad ge but much of it expressed admiration for his idealism and indifference to worldly gains. unprecedented amount of coverage of the 2 Fields Medals contrasts sharply with that f 2002 medals, which many media outlets p over with silence. Click here for a list of ci for articles in print and web media.

--- *Allyn Jackson*

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awarded for the solution of this 100-year old problem, and that the recipient will be the Russian geometer Grigory Perelman. (Perelman's 2003 visit to the West, shortly after he had posted three papers on the Web explaining his method for settling a more general problem called the Geometrization Conjecture, drew significant media coverage - mostly because of the $1,000,000 Clay Mathematics Institute prize money potentially forthcoming. See this column for May and June of that year.) NPR Host Scott Simon: "Keith, ... explain Poincaré's conjecture to us." Devlin, given the medium and the time constraint, finesses the question but does a commendable job: "... the question is, what is the topological shape of the space we live in? What makes that difficult to answer for physicists is trying to answer it from the inside. Is there a way from inside space of determining what its topological [shape] is? Is it like a three-dimensional analog of a sphere? Or is it more like a donut shape?"

Simon quizzes Devlin about the current status of the conjecture and Perelman's proof. Devlin does his best ("... nobody was prepared to say for certain this proof is correct. So we've got this bizarre situation ... "), and mentions the recently published proof by Cao and Zhu. Simon: "Now I understand there's some controversy ... as to why [Perelman] posted it on the web and didn't submit it to a professional jury." Devlin: "... Perelman is a very, very reclusive guy." He came and gave his lectures in 2003 but "then he went back to Russia and when people tried to contact him, ... saying ... 'there's a step on this page I don't understand and can you explain that,' he didn't respond. He ... showed no interest in taking the steps that you'd have to perform if you wanted to claim this million-dollar prize. He'd simply put it on the Internet and then had nothing more to do with it, which was very frustrating for Western mathematicians, of course." Interview available online.

[Bruce Kleiner and John Lott, not exactly "nobody," had posted on May 26 a report stating: "The purpose of these notes is to provide the details that are missing in [the preprints], which contain Perelman's arguments for the Geometrization Conjecture." And just as this interview took place, John Morgan and Gang Tian were posting "a detailed proof of the Poincaré Conjecture. The arguments we present here are expanded versions of the ones given by Perelman in his three preprints posted in 2002 and 2003." Finally, Perelman's unresponsiveness is also reported to be inversely proportional to the mathematical sincerity he perceives in his correspondents. -TP]

. . . and in the *New York Times*

The ICM (International Congress of Mathematicians) falls too late in August for the media fallout to be available to the present column, but the Perelman-Poincaré story is sure to be irresistible. It *is* a good story! Science, money, cultures, human nature, there's something for everyone. Dennis Overbye does a

Reviews
Books, plays and films ab mathematics

Citations for reviews of books, plays, mov and television shows that are related to mathematics (but are not aimed solely at professional mathematician). The alphabe list includes links to the sources of review posted online, and covers reviews publishe magazines, science journals and newspap since 1996.

More . .

nice job with "Elusive Proof, Elusive Prover: A New Mathematical Mystery" in the *New York Times* for August 15, 2006 - Grisha's picture is on the front page. The math is approximate but Overbye does his homework and quotes Bruce Kleiner, Shing-Tung Yau, John Morgan, William Thurston, Robert Greene, Michael Anderson, all mathematicians connected with the proof or the prover, and James Carlson, the president of the Clay Institute. Everyone, of course, except Perelman himself who "is said to have resigned from Steklov" (the Mathematical Institute of the Russian Academy) and is not answering his e-mail. Some felicitous tropes: a compact manifold is one that "has a finite extent: no matter how far you strike out in one direction or another, you can get only so far away before you start coming back, the way you can never get more than 12,500 miles from home on the Earth." And the Ricci flow "acts like heat, flowing through the space ..., smoothing and straightening all its bumps and curves to reveal its essential shape, the way a hair dryer shrink-wraps plastic." And a new wrinkle: "Allowing that Dr. Perelman, should he win the Clay Prize, might refuse the honor, Dr. Carlson said the institute could decide instead to use award money to support Russian mathematicians, the Steklov Institute or even the Math Olympiad."

As a bonus, the *Times* prints a series of illustrations with caption: "The Essential Grisha. A photo of the mathematician Grigory Perelman is altered by a technique known as the Ricci flow, becoming more and more spherical."

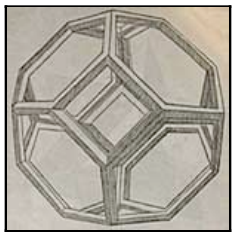
"In a violent time, it is a pleasure to rejoice in a peaceful triumph." This is the *Times* editorial page, joining in the next day with "Of Math Proofs and Millionaires," possibly their first foray into mathematics. "If a reclusive Russian mathematician really has solved this riddle, as those competent to judge seem to agree, he will win a spot as one of the great mathematical minds of the age." They refer to Overbye's piece for the details, and end: "What impact this will have on the practical world is uncertain. We just want to celebrate the dedication--some might call it obsession--that led Dr. Perelman to labor for years to solve a problem that once seemed insoluble."

More math on NPR: encryption; soccer-ball design

July 2006 was a busy month for the NPR Math Guy. Besides the episode above, there were two other occasions for Scott Simon to elicit his mathematical explanations. On July 1 it was The Math Behind Pellicano's Code. Anthony Pellicano, the Hollywood private eye, has been charged with illegal wiretapping. The government has seized his computer but Pellicano has wrapped some of his files in two layers of code which have so far proved impenetrable. Stating that "encryption is the sport of mathematicians," Simon conjures up Devlin and askes him "How can one man ...

flummox some of the nation's best code-breakers?" Devlin surmises that Pellicano is using PGP ("Pretty Good Privacy"), Phil Zimmerman's freeware encryption system, which Devlin terms "incredibly secure." What kind of math do you have to know to understand it? Mainly number theory ("One of the most difficult and most advanced parts of mathematics. It goes back two or three hundred years; it involves questions like Fermat's Last Theorem and the Riemann Hypothesis.") And parenthetically: "It's believed that the NSA does actually know how to crack PGP. However they've never said that and why should they?"

One week later, in the context of the World Cup playoffs, it was Soccer 'Sphere' Kicks Off a Circular Argument. The question is whether Adidas' new FIFA-approved design for the ball to be used in the games is actually rounder than the previous models. Devlin goes off on an interesting but irrelevant tangent about the Euler characteristic. "The design of any soccer ball doesn't have to just obey the rules that FIFA imposes, it has to obey the laws of mathematics, in particular Euler's equation." Simon: "You mathematicians can take the fun out of almost anything." [Topological-geometric questions (for example: given a number N, what is the roundest ball that can be assembled out of N flat, convex pieces?) are not relevant to the way the latest soccer-balls are made, because their covers are assembled from polyurethane patches which come moulded with the correct curvature. The new official ball is topologically a truncated octahedron, with 24 vertices, 36 edges and 14 faces, of which six (the squares) have been shaped into figure-eights, and eight (the hexagons) appear as three-lobed, spiral boomerangs, four with each orientation.-TP]



Left: truncated octahedron, from Pacioli's 1509 *De Divina Proportione*, after a design by da Vinci; image courtesy Bill Casselman. Right: World Cup 2006 official ball, from FIFAworldcup.com, image used with permission.

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