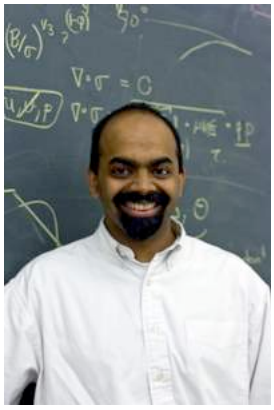
MATH in the MEDIA
A Monthly Magazine from the American Mathematical Society

Math Digest

Summaries of Media Coverage of Math

Edited by Allyn Jackson, AMS
Contributors: Mike Breen (AMS), Claudia Clark (writer and editor), Lisa DeKeukelaere (2004 AMS Media Fellow), Annette Emerson (AMS), Brie Finegold (University of California, Santa Barbara), and Adriana Salerno (Bates College)



Lakshminarayanan Mahadevan, of Harvard University, who recently won a US$500,000 MacArthur "Genius" Grant.

This Month's Math Digest Summaries: Posted here 1 October 2009

- "Google works on a different web," *Science News*, 26 September 2009
- "Erasing Dark Energy," *Seed*, 24 September 2009
- "Mathematics expert: IRV not the answer," *Minnesota Public Radio*, 23 September 2009
- "'Genius' Mathematician Seeks New Problems," an interview with Lakshminarayanan Mahadevan. National Public Radio's *All Things Considered*, 22 September 2009
- "Go forth and multiply," *Adelaide Now...*, 17 September 2009
- "Super-30 Founder in Limca World Record Book." *PatnaDaily.com*, 16 September 2009
- "OK Derren, now tell us how you REALLY did it: Experts pour scorn on illusionist's explanation," *Daily Mail*, 12 September 2009
- "The Mysterious Equilibrium of Zombies…and Other Things Mathematicians See at the Movies," *The Boston Globe*, 6 September 2009.
- Articles about British government's apology for its treatment of Alan Turing
- "5 College Majors On the Rise: Computational Science," and "How They Did It," *The Chronicle of Higher Education*, 4 September 2009

- "Origin of Computing," *Scientific American*, September 2009
- "Origins," a series of articles by various authors. *Scientific American*, September 2009
- Two articles on results from the 2009 Joint Statistical Meetings, *Science News*, 29 August 2009
- "The economy needs agent-based modelling," *Nature*, 6 August 2009
- "Dark energy may disguise shape of universe," *New Scientist*, 3 August 2009

Math Digest Archives 2009 || 2008 || 2007 || 2006 || 2005 || 2004 || 2003 || 2002 || 2001 || 2000 || 1999 || 1998 || 1997 || 1996 || 1995

Click here for a list of links to web pages of publications covered in the Digest.

"Google works on a different web," by Susan Milius. *Science News*, 26 September 2009, page 10.

Before there was a World Wide Web, there were food webs--directed graphs in which the nodes are species and edges signify that one species eats the other. Stefano Allesina, an ecologist at the University of Chicago, has adapted Google's PageRank algorithm to analyze which species are crucial to the survival of food webs. Analogous to how the importance of web pages depends on the importance of those pages that link to it, Allesina assigns importance to species based on the importance of species that eat them. He says that the algorithm does a better job of predicting food web collapse than previous methods. The research, "Googling Food Webs: Can an Eigenvector Measure Species' Importance for Coextinctions?", is in the September 3 issue of *PLoS Computational Biology*.

--- *Mike Breen*

Return to Top

"Erasing Dark Energy," by Veronique Greenwood. *Seed*, 24 September 2009.

Mathematicians Blake Temple (UC Davis) and Joel Smoller (University of Michigan) "have now found a way to explain the observation that led researchers to propose dark energy." While doing experiments with shockwaves, they found that "an expanding wave with its epicenter near the Earth could produce the dimming effects teams had observed." After consulting with astrophysicists and other mathematicians they concluded: "An accelerating wave of expansion following the Big Bang could push what later became matter out across the universe, spreading galaxies farther apart the more distant they got from the wave's center. If this did happen, it would account for the fact that supernovae were dim--they were in fact shoved away at the very beginning of the universe. But this would have been an isolated event, not a constant accelerating force. Their explanation of the 1998 observations does away with the need for dark energy." Some cosmologists dismiss the theory, others are open to it. NASA plans to send a telescope into space to gather more data about what dark energy might be, but that's not until 2016. See also: "Mathematicians' Alternate Model of the Universe Explains Away the Need For Dark Energy," by Jeremy Hsu, *Popular Science*, 25 September 2009.

--- *Annette Emerson*

Return to Top

"Mathematics expert: IRV not the answer," by Curtis Gilbert. *Minnesota Public*

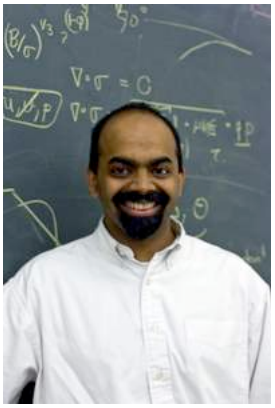
***Radio*, 23 September 2009.**

The city of Minneapolis will use instant runoff voting in its 2009 municipal elections. Don Saari (University of California, Irvine), who has done a great deal of analysis of different voting systems, spoke to an audience at the Institute for Math and its Applications about instant runoff voting and its flaws. He is no fan of the most commonly used system, plurality voting in which the top vote-getter wins, but he said, "We haven't gotten rid of the cancer. The plurality vote determines who's going to go to the runoff. So, if we have a system that's distorted and gets us the wrong two people for the runoff, we're in trouble." The *Minnesota Public Radio* website has a nice video illustrating an example of an election using instant runoff voting.

--- *Mike Breen*

Return to Top

"'Genius' Mathematician Seeks New Problems," an interview with Lakshminarayanan Mahadevan. National Public Radio's *All Things Considered*, 22 September 2009.



L. Mahadevan, a mathematician at Harvard University, is among 24 innovators in art, science, writing who will each receive a MacArthur "genius grant" of US$500,000 over the next five years. Mahadevan "applies complex mathematical analyses to a variety of seemingly simple, but vexing, questions across the physical and biological sciences - how cloth folds when draped, how skin wrinkles, how flags flutter, how Venus' flytraps snap closed." In addition to the interview on his being awarded the MacArthur grant, hear his interview, "The Math of Folding Maps," (on NPR's *All Things Considered*, 15 March 2008).

--- *Annette Emerson*

Return to Top

"Go forth and multiply," by Penelope Debelle. *Adelaide Now...*, 17 September 2009.

Simon Pampena is Australia's stand-up math comedian. The newspaper covers his *Super Mega Maths Battle for Planet Earth* performance. "There are maths teachers and a smattering of older teens but it is mainly mums or dads with groups of children. The show is loosely based on the premise of an alien invasion from Planet Calculus and it hides maths inside a package of popular culture and audience participation. The songs include a feat of memory in which Pampena recites pi to the 50th decimal--he knows it to 100 places but could not cram it into a song." This "National Numeracy Ambassador" draws appreciative crowds around the country, which aims to improve its math literacy. "The problem is not just one of national standing and self-esteem. Maths is at the heart of inventions that make a nation great. As the national strategy points out, without maths there would be no cars, no planes, no mobile phone networks, and no computers. Our dependency on maths will only increase as we rely on future technologies." Another ambassador--by example--is Australian Terence Tao, who at the time of the article was visiting his Adelaide family during a national Clay-Mahler lecture tour. Tao was the first Australian--and youngest person ever--to win the prestigious Fields Medal. He started to learn arithmetic by the age of two from watching *Sesame Street*, and studied throughout

his school years with a mentor who was a retired mathematician. Pampena's career path was "a combination of good teachers and *Star Wars*. It took him a while but Pampena finally understood that while the science in *Star Wars* was fiction, there was real science out there that was just as interesting." The article provides a nice profile of these two mathematicians, both of whom want to let young students know that math is present in some unexpected places, and is needed to pursue studies and careers in all the sciences.

--- Annette Emerson

Return to Top

"Super-30 Founder in Limca World Record Book." *PatnaDaily.com*, 16 September 2009.

Anand Kumar. Photograph courtesy of *PatnaDaily.com*

Mathematician Anand Kumar, who founded Super-30 Institute (the Ramanujan School of Mathematics) dedicated to training underprivileged boys and girls to take the prestigious India Institute of Technology (IIT) entrance exam, was inducted into the 2009 Limca Book of World Records for his pioneering work providing free coaching for students to pass the difficult IIT entrance test. Over the past seven years the Institute has coached 210 students, of which 182 have passed the exam. As a young student, Kumar himself was not able to attend Cambridge University due to his lack of money, but he since has become a highly-regarded mathematician who tutors and provides books, room and board for to 30 poor but bright students each year at the Super-30 Institute in Patna, India.

--- Annette Emerson

Return to Top

"OK Derren, now tell us how you REALLY did it: Experts pour scorn on illusionist's explanation," by Paul Revoir. *Daily Mail*, 12 September 2009.

Image © iStockphoto.com.

Claiming to have used the "Wisdom of Crowds Theory" as explained by financial journalist James Surowieki in his 2004 book by the same title, Illusionist Derren Brown correctly predicted the result of a recent lottery in the UK. "The Wisdom of Crowds Theory" postulates that, in matters of estimation, the average of the responses across a large crowd is more likely to be accurate than an individual response. Brown supposedly applied this by simply averaging the responses given by 24 people who were asked to guess the winning numbers on "live" television. The problem: There is no evidence by which to make an educated guess or estimate as to what lottery numbers are the winning ones.

Several professors of philosophy and mathematics were quoted in the article and called Brown's pseudo-mathematical explanation "rubbish." The only rational conclusion is that the illusion was the result of tricky film editing. However, the illusionist's enthusiasm for math is appealing: "This was to lead me down a fascinating path into mathematics, superstition and a powerful, beautiful secret that can only be achieved when we all put our heads together," said Brown.

In a related story, the same six numbers came up in consecutive drawings of the Bulgarian lottery and 18 people picked the winning numbers the second time (no one chose the numbers the first time they came up). The coincidence led to an investigation in Bulgaria. The *Wall Street Journal's* Number Guy, Carl Bialik, writes about the coincidence.

--- *Brie Finegold*

Return to Top

"The Mysterious Equilibrium of Zombies...and Other Things Mathematicians See at the Movies," by Samuel Arbesman, *The Boston Globe*, 6 September 2009.

While movies about mathematics or mathematicians are few and far between, many films incorporate mathematical ideas. In this article, Harvard Medical School postdoctoral fellow Samuel Arbesman discusses several films—*Harry Potter and the Half-Blood Prince*, *The Dark Knight*, *Six Degrees of Separation*, *Reservoir Dogs*, and zombie flicks—from a mathematician's perspective.

For example, in the opening scene of the latest Harry Potter film, as London's Millennium Bridge is being destroyed, the simultaneous buckling and lateral movement of the bridge would probably bother "those who think about math." But math certainly was used to try to determine the cause of the real-life wobble experienced by the people who crossed the bridge after its initial opening in 2000. Or consider that latest Batman film, in which the Joker offers passengers on two ferries a choice that a mathematician would recognize as a form—albeit twisted—of the prisoner's dilemma. Then there is the statement made by Stockard Channing's character in *Six Degrees of Separation* about the number of people that separate every possible pair of people on the planet. Research by a few mathematicians has shown the number to be closer to an average of 6.6, at least in online networks. Go to last month's Math Digests, for more on mathematical models applied to zombie epidemics. See you at the movies!

--- *Claudia Clark*

Return to Top

"Calls for pardon for code-breaker Turing," by Susan Watts. *BBC News*, 4 September 2009.
"PM apology after Turing petition," by Robert Hall. *BBC News*, 11 September 2009.
"PM sorry over code-breaker treatment," by Robert Hall. *BBC News*, 11 September 2009.

Alan Turing is most famous for his remarkable work in breaking the Enigma code during World War II (which is believed to have been crucial to the Allies' victory). It is unfortunate that his success was overshadowed a few years later by his "gross indecency" trial (in other words, he was tried for being gay). He admitted to having a relationship with a man, and chose chemical castration over a prison sentence. Two years after he started "treatment" for his homosexuality, at 41 years of age, Turing committed suicide. The Number 10 website, led by computer scientist John Graham-Cumming, recently called for a posthumous government apology for the way this brilliant scientist was treated, and the government complied. Prime Minister Gordon Brown said in the *Telegraph* newspaper: "his treatment was of course utterly unfair and I am pleased to have the chance to say how deeply sorry I and we all are for what happened to him." Perhaps the acknowledgment of the "appalling treatment" Turing received will give way to a more widespread recognition of one of the great minds behind the birth of computers and artificial intelligence.

--- *Adriana Salerno*

Return to Top

"5 College Majors On the Rise: Computational Science," and "How They Did It," by Karin Fischer and David Glenn. *The Chronicle of Higher Education*, 4 September 2009, pages A8 and A10.

The *Chronicle* identifies computational science—a field that involves modeling aspects of our world from weather to potato chips—as one of five undergraduate majors expected to grow in popularity. Like the other four selected, computational science is a blend of multiple disciplines, in this case mathematics and computer sciences, with other scientific fields. Bringing multiple departments together is key to a successful program, and state schools in Ohio have augmented their programs further by allowing cross-enrollment between universities. One of the oldest programs in the country, founded in 1998 at the State University of New York College at Brockport, successfully used its program to boost enrollment in hard science departments. Establishing a program can be difficult, taking for example the concerns of Oregon State professors about the importance of such work both for students and for their own academic careers, but the article discusses the positive prospects for computational scientists in the job market.

--- *Lisa DeKeukelaere*

Return to Top

"Origin of Computing," by Martin Campbell-Kelly. *Scientific American*, September 2009.

In this article, Martin Campbell-Kelly, author of the book *Computer: A History of the Information Machine*, describes some of the events that would eventually lead to the development of the modern computer.

During the French Revolution, the French ordinance survey office commissioned a new set of mathematical tables, known as the *Tables du Cadastre*, to aid in the republic's effort to reassess property taxes. The work took 10 years to complete—the tables were computed by hand, of course—but the resulting manuscript was never published. After seeing the tables in 1819, a young Charles Babbage was inspired to replicate the project—with a machine that he would call the "Difference Engine." Babbage completed a working model of his machine in 1832, but then abandoned it for a "grander vision": the Analytic Engine. As Campbell-Kelly writes, "Whereas the Difference Engine had been limited to the single task of table making, the Analytic Engine would be capable of any mathematical calculation." Babbage designed it to have a processor, memory, and the user input. However, his thousands of pages of notes would not be read by scholars until the 1970s!

Campbell-Kelly then discusses "the most important analog computing instrument" before World War II: the Differential Analyzer. The first digital computer would soon follow: the ENIAC, finished in 1945. But it would be the design of the EDVAC that would mark a shift from the computer as "a mathematical instrument to a universal information-processing machine." Campbell finishes the article with an analysis of how computers have evolved since the EDVAC, and describes some of the "multiple possibilities for radical evolution" that exist today.

--- *Claudia Clark*

Return to Top

"Origins" a series of articles by various authors. *Scientific American*, September 2009.

Joseph Marie Jacquard showing his loom to Lazare Carnot.

Among the "Origins" collection of articles on important scientific breakthroughs are some related to mathematics. "Buckyballs and Nanotubes," by Philip Yam (page 82), reports on the buckminsterfullerene, "a molecule comprised of carbon atoms that lie at each vertex of 12 pentagons and 20 hexagons arranged like the panels of a soccer ball, which forms naturally in many combustion processes involving carbon (even candle burning)" and may have future applications in technology. "Economic Thinking," by Davide Castelvecchi (page 82), touches on how humans make choices based on what they think is valuable and what they think is a rational decision. "Graphical Perspective," by George Musser (page 84), notes that "'realistic' imagery depends on relatively recent cultural assumptions and technical skills." For instance, 15th century Italian artist "Leon Battista Alberti worked out the math. Rigorous geometric constructions ensured that natural depth cues such as size, vertical position and tile patterns were mutually consistent for maximum verisimilitude." The question is whether viewing a perspective drawing requires "accepting and overlooking its limitations, such as a single viewpoint." Would aliens be able to decipher our drawings, and would we recognize alien artwork? "The Mechanical Loom," by Jonathon Keats (page 88), provides a good introduction to Jean-Charles Jacquard's use of perforated cards that were fed through a loom to make (program) patterns--an invention that inspired the player piano and the first computers.

--- *Annette Emerson*

Return to Top

"Baseball by the Numbers" and "Cable Boxes Identify Bargain and Lemon Commercial Slots," by Laura Sanders. *Science News*, 29 August 2009, page 16.

These two articles cover the Joint Statistical Meetings, which were held August 1-6 in Washington, DC. In a session entitled "Evaluating and Predicting Player Performance," Benjamin Baumer, who is the Statistical Analyst for the New York Mets and a graduate student in mathematics, presented his paper on improving the system by which baseball players' abilities to field are quantified. The current rating is a function of the number of errors and the number of opportunities the player had to catch the ball. The proposed rating would assign a weight to each catch according to the part of the field on which the ball was caught. Thus players who make particularly difficult plays would be duly rewarded, where they currently are not. This method assumes that the player's position on the field can be easily and accurately measured. Although the new rating system would be fairer than the current one, the point is made that human observations are not to be discounted in favor of numbers only.

The second article discusses the mistake in assuming that the most valuable commercial spots are during hit shows. According to data taken from cable boxes, blockbuster shows are not necessarily more likely to retain viewers during commercial breaks than other shows. Marketing professor David Schweidel has found that drama fans "don't touch that dial" while reality show viewers tend to flip channels. He hopes further data collection will reveal more patterns in our tv-watching habits.

--- *Brie Finegold*

Return to Top

"The economy needs agent-based modelling," by J. Doyne Farmer and Duncan Foley. *Nature*, 6 August 2009, page 685.

In this article, Farmer and Foley propose a different, seemingly better way to model the economy to help guide financial policies, known as an agent-based model. Traditionally, two types of models have been used. The first one is based on empirical statistical models based on past data, and it fails whenever there are great changes. The second is "dynamic stochastic general equilibrium," which basically assumes a perfect world. The authors propose using agent-based modeling, or computerized simulations of interactions between a number of agents and institutions with some prescribed rules. These models simulate complex and nonlinear behavior that is so far intractable in equilibrium models. They have been used successfully in areas such as epidemiology and traffic control. The

authors give a detailed account of how the systems and models have evolved throughout history and how the ones currently used will continue to fail in predicting the economy. They also mention a few promising efforts in applying agent-based models in small portions of the economy, such as Farmer's work exploring how leverage affects fluctuations in stock prices. In general, these models seem to give statistics that look very much like reality. Of course, the researchers admit, "creating a carefully crafted agent-based model of the whole economy is a huge undertaking." Such research would require serious computing power and interdisciplinary collaboration, and "a few million dollars – much less than 0.001% of the US financial stimulus package against the recession."

--- *Adriana Salerno*

Return to Top

"Dark energy may disguise shape of universe," by Pedro Ferreira. *New Scientist*, 3 August 2009.

Image: European Space Agency.

Cosmologist Ferreira dissects and questions the key idea that the universe is flat—a widely held belief that multiple research efforts appeared to confirm in the late 1990s and early 2000s. Cosmologists had believed the universe must be flat because it had not collapsed, as it would if it had positive curvature, or blown apart, as it would if the curvature were negative. Research in the past few decades examined the apparent change over hundreds of thousands of years in the size of spots in the earth's cosmic microwave background and concluded that the results fit the change expected if the universe were flat. The problem, according to Ferreira, is gaps in cosmologists' understanding of dark energy, which makes up 70% of the universe and whose properties contribute to how scientists computed the expected change in the size of the spots. Understanding dark energy is interdependent with understanding the universe's curvature, but upcoming NASA missions and telescope construction are intended to address these questions.

--- *Lisa DeKeukelaere*

Return to Top

Math Digest Archives 2009 || 2008 || 2007 || 2006 || 2005 || 2004 || 2003 || 2002 || 2001 || 2000 || 1999 || 1998 || 1997 || 1996 || 1995

Click here for a list of links to web pages of publications covered in the Digest.

Return to Top