MAPS/CARMA: Celebrating Our Outreach in the Mathematical Sciences

17th August 2012, Nelson Room in the Shortland Building

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Communicating with, to and for the Public and Media

The most prominent requisite to a lecturer, though perhaps not really the most important, is a good delivery; for though to all true philosophers science and nature will have charms innumerably in every dress, yet I am sorry to say that the generality of mankind cannot accompany us one short hour unless the path is strewed with flowers.

…

A truly popular lecture cannot teach, and a lecture that truly teaches cannot be popular.

Michael Faraday (1791-1867)

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Revised 16-8-12

OUTLINE

Jonathan M. Borwein

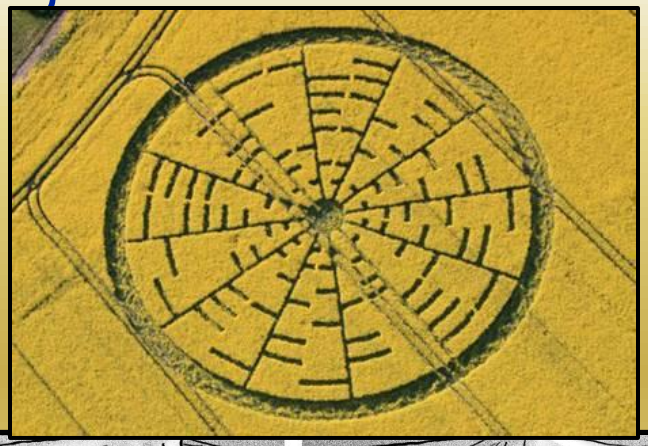
Newcastle

Goals: Pedagogy, Promotion, Policy, Pleasure

- Which Public, Which Media?
- Public Lectures and Presentations
- Interviews (live or background)
- Print and Blogging (what topics succeed?)
- Expository Writing (for us or others)
- A Web Presence is Important

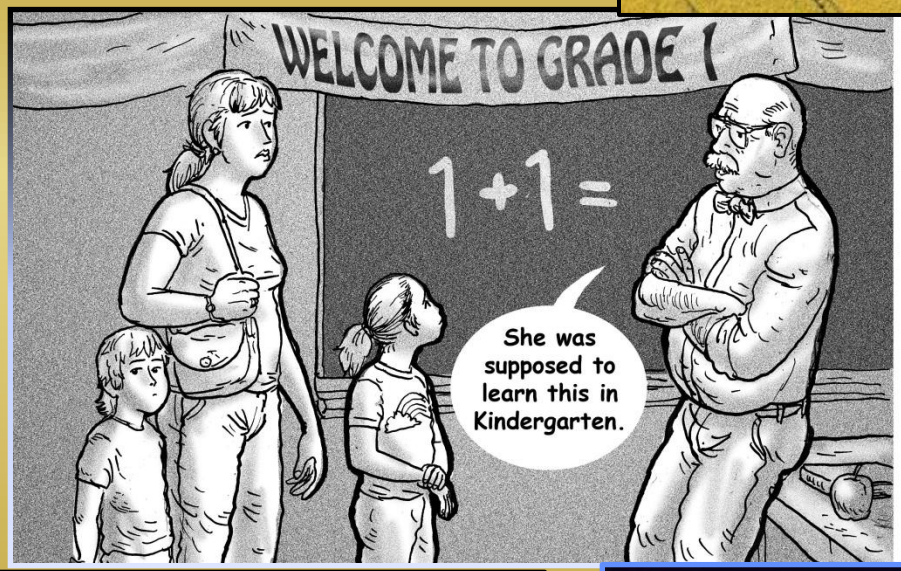
The object of mathematical rigor is to sanction and legitimize the conquests of intuition, and there was never any other object for it. – Jacques Hadamard (1865-1963)

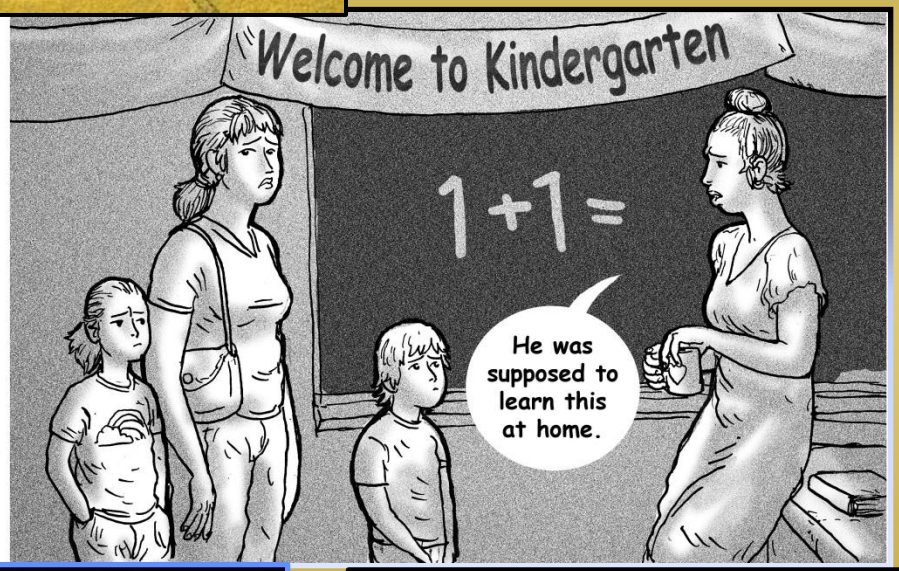
Crop Circles, Curriculum and Curiosity



purports to show

$$e^{i\pi} = -1$$





Three Things to Remember

All professions look bad in the movies ... why should scientists expect to be treated differently?

Michael Crichton addressing 1999 AAAS Meetings, as quoted in *Science* Feb. 19, 1999, p. 1111.

✓ We are not unique

Newspapers cover conflict!

National Post Education Editor to CMS Forum on High school Education, Montreal 2002

✓ Answering "Why do you never cover good news stories?"

Harry Potter is dangerous.

Parisian, Ivar Ekeland speaking at 2002 CMS Forum

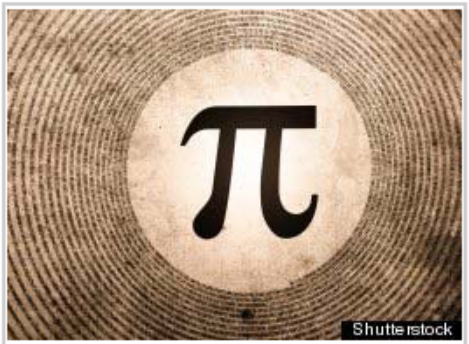
✓ Led to fire storm and 15 editorials in Canada/US in days

✓ Anything you say may be used against you ….

Pi Never Disappoints

U.S. Population Reaches 314,159,265, Or Pi Times 100 Million: Census

The Huffington Post | By Bonnie Kavoussi
Posted: 08/14/2012 4:03 pm Updated: 08/14/2012 5:55 pm



Pi.

The U.S. population has reached a nerdy and delightful milestone.

Shortly after 2:29 p.m. on Tuesday, August 14, 2012, the U.S. population was exactly 314,159,265, or Pi (π) times 100 million, the U.S. Census Bureau reports.

Pi (π) is a unique number in multiple ways. For one, it is the ratio of a circle's circumference to its diameter. It is also an irrational number, meaning it goes on forever without ever repeating itself. Are you remembering how much you loved geometry class? You can check out Pi to one million places here.

Above: Aug 14th 2012 *Huffington Post.* See also https://theconversation.edu.au/bad-numbers-make-for-killer-headlines-and-dodgy-news-7894

Right: a **Mazda 3.1415925** … spotted on the road in the Bay area recently.

Science Journalists

Good ones are remarkable people

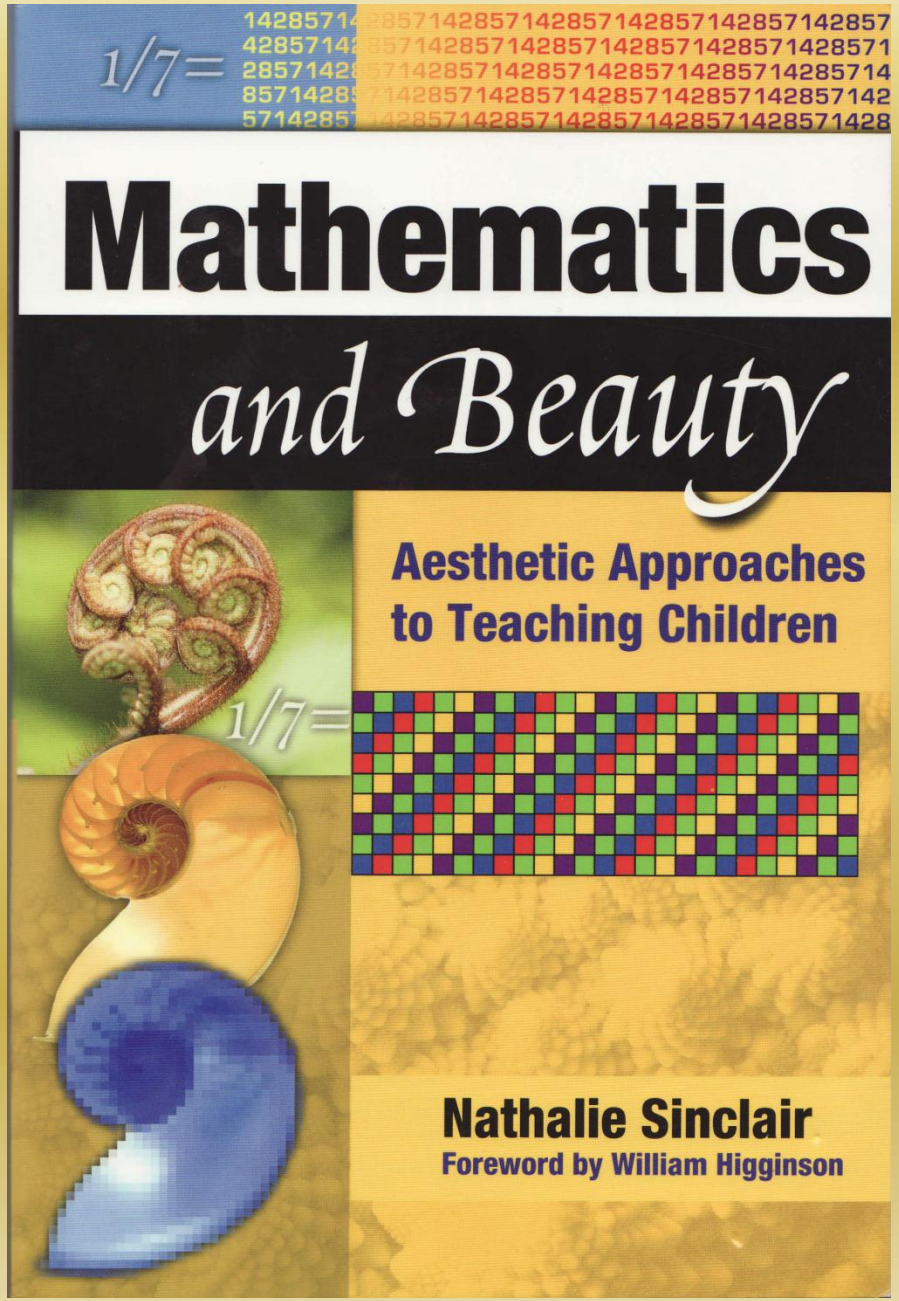
- ✓ Scientific American, American Scientist (Brian Hayes), Science News (Ivars Petersen), New Scientist, AMS (Barry Cipra, Allyn Jackson), ABC (ex. Paul Willis), CBC, BBC, NYT (ex. James Gleick), Globe and Mail, LA Times, etc.
- ✓ Very quick studies under tight deadlines, covering many fields; often with strong science background
- ✓ They are your friends; get used to being edited

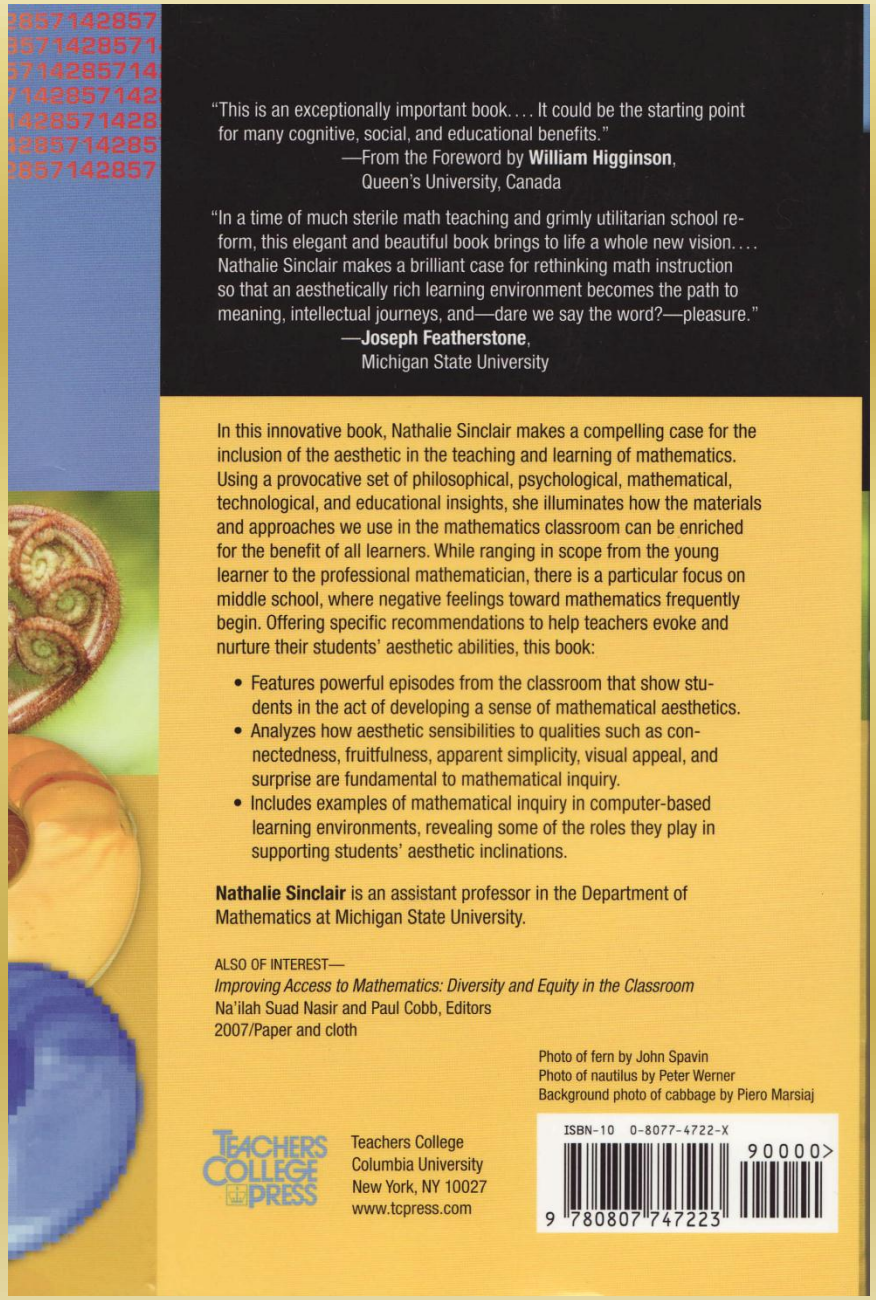
Not all are so well qualified

- ✓ The reporter responsible for the quote below fell asleep during my brother's lecture
- ✓ He woke up during the next talk on savant calculators and did not notice the speaker had changed

Srinivasa Ramanujan (1887-1920) was an Indian idiot savant. – Peter Borwein
(speaking at the AAAS in 1987 – as quoted in Chicago and syndicated widely)

Mathematics and Beauty 2006





"This is an exceptionally important book.... It could be the starting point for many cognitive, social, and educational benefits."
—From the Foreword by **William Higginson**,
Queen's University, Canada

"In a time of much sterile math teaching and grimly utilitarian school reform, this elegant and beautiful book brings to life a whole new vision.... Nathalie Sinclair makes a brilliant case for rethinking math instruction so that an aesthetically rich learning environment becomes the path to meaning, intellectual journeys, and—dare we say the word?—pleasure."
—**Joseph Featherstone**,
Michigan State University

In this innovative book, Nathalie Sinclair makes a compelling case for the inclusion of the aesthetic in the teaching and learning of mathematics. Using a provocative set of philosophical, psychological, mathematical, technological, and educational insights, she illuminates how the materials and approaches we use in the mathematics classroom can be enriched for the benefit of all learners. While ranging in scope from the young learner to the professional mathematician, there is a particular focus on middle school, where negative feelings toward mathematics frequently begin. Offering specific recommendations to help teachers evoke and nurture their students' aesthetic abilities, this book:

- Features powerful episodes from the classroom that show students in the act of developing a sense of mathematical aesthetics.
- Analyzes how aesthetic sensibilities to qualities such as connectedness, fruitfulness, apparent simplicity, visual appeal, and surprise are fundamental to mathematical inquiry.
- Includes examples of mathematical inquiry in computer-based learning environments, revealing some of the roles they play in supporting students' aesthetic inclinations.

Nathalie Sinclair is an assistant professor in the Department of Mathematics at Michigan State University.

ALSO OF INTEREST—
Improving Access to Mathematics: Diversity and Equity in the Classroom
Na'ilah Suad Nasir and Paul Cobb, Editors
2007/Paper and cloth

Photo of fern by John Spavin
Photo of nautilus by Peter Werner
Background photo of cabbage by Piero Marsiaj

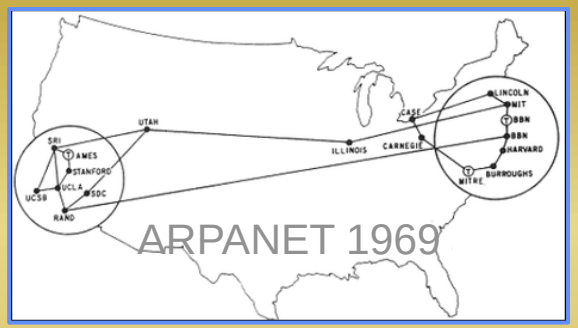
TEACHERS COLLEGE PRESS
Teachers College
Columbia University
New York, NY 10027
www.tcpress.com

ISBN-10 0-8077-4722-X
9 780807 747223 90000>

Which Public?

Schools (and everything else)

- ✓ Know the level and the physical environment
  - ✓ Bring a clock. Is there a blackboard? Can it be seen?
  - ✓ How big is the screen? Ask if you can't look. Green is bad
- ✓ Never run over. No one is *that* interested



Other Sciences and Disciplines

- ✓ Domains of expertise decay quadratically
- ✓ ACRONYMS and technical terms: "*Yiddish speaks itself.*"
- ✓ Learn to "lie" for everyone's benefit

The Public

- ✓ Great and Unwashed: have something for everyone
- ✓ Elite: Vancouver Academy or Shine Dome
- ✓ World Science Festival: 600 paying guests age 7-70

A centre of excellence is a place where second rate people do first rate work. – Michael Faraday

Mysteries of the Mathematical Universe

New School Manhattan 5/6/11

Borwein, de Sautoy, Devlin and Singh

WSF Opening Video

Public Lectures and Presentations

Public Lectures

- ✓ Many are listening in second language – esp. in Universities
- ✓ So view overheads like sidebars in *Science* or *SciAmer*
- ✓ Limit formulas (others may hum them) and 'cognitive stress'.
- ✓ Don't read your slides
- ✓ Time yourself in advance: have multiple natural endpoints

Panel Discussions

- ✓ Know your brief and 'try' to keep to it
- ✓ Moderator (WSF) or opponent (*Huff Post* Aug 5th) may not

Web Presence

- ✓ Crucial for you and for the Uni
  - ✓ "*I never knew you were so high up in CECM!*"
- ✓ For recruitment at all levels
- ✓ My Maths Portal: Links and Tools (my own and others)

Interviews

For Daily or Weekly Press

- ✓ Ask to help "fact check" not to "approve" the article
  - ✓ Never say "off the record" what you can't live with on the record
- ✓ You never have real control; my recent KAU-Saudi comment to *Australian* was quoted:
  - ✓ *"It is a pretty cynical attempt to hijack the ratings. It may work" in mathematics to do real good…*

For Live Media

- ✓ Know what they want to discuss
- ✓ Practice in advance: role play
- ✓ Make sure you make your main points

3. Publish the same result several times. 4. You are more likely to be remembered by your expository work. – Gian-Carlo Rota [1932-1999], "Ten lessons I wish I had been taught" (1996)

Jon Borwein's Blogs and Other Non-Technical Online Writing

Where to Look

1. Blogs in the Huffington Post
   March 15, 2012. Pi Day in America (Huffington Post)
   March 2011. Piday article for ABC Science on line
2. My online articles in The Conversation (since March 2011)
3. Two mathematicians contemplate the cosmos at Math Drudge (since June 2009)

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4. My mathematics, science and society quotation collection or qlog (since 1995)
5. Talking to Telstra (August 2010)
6. The Prophet in Clayton Park (Sept 2007)
7. The Book of Lawrence

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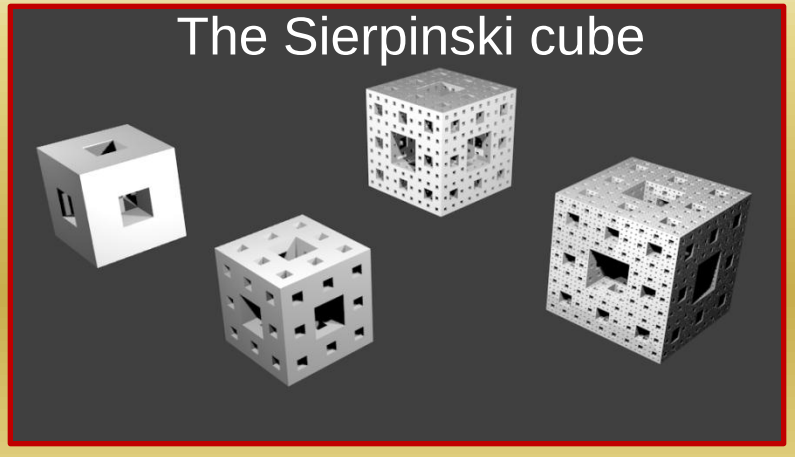
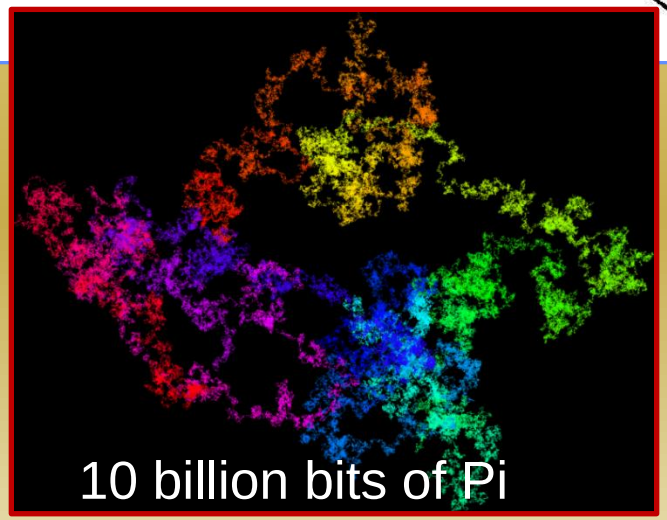
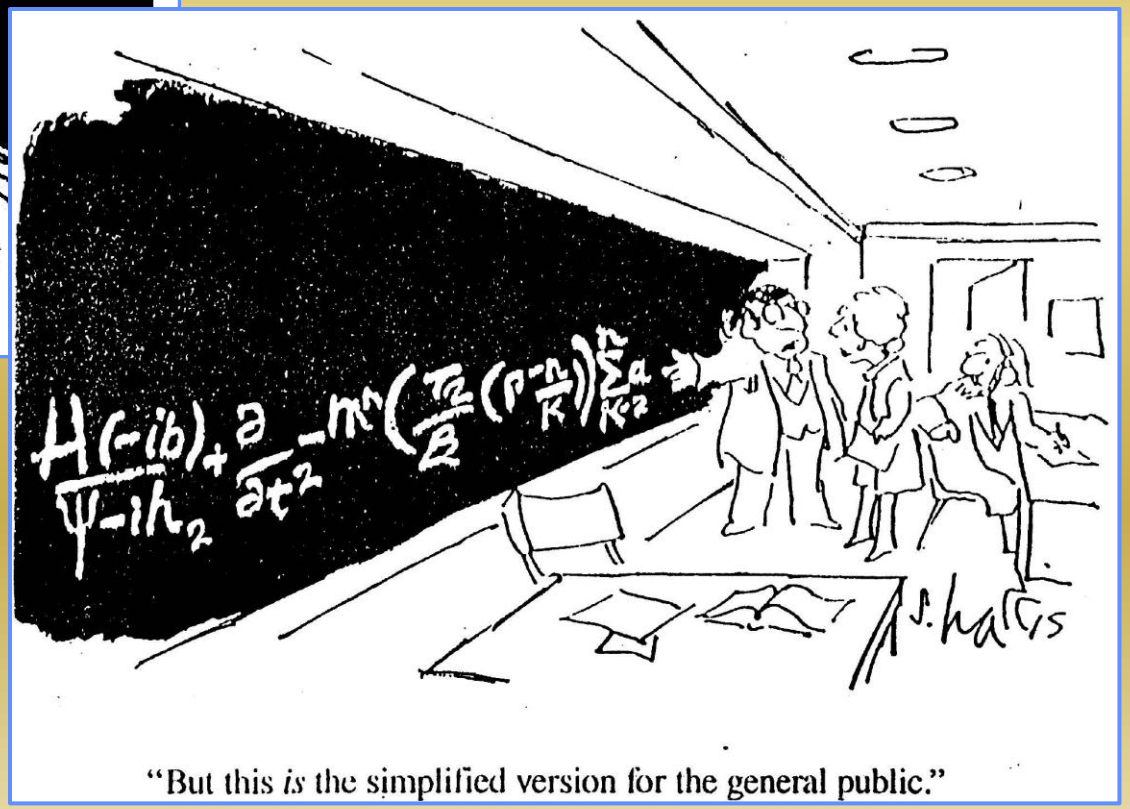
8. Follow my nephew Zachary Nevin's July 2012 ride across Canada to raise awareness of MS.
   The story was aired nationally in Canada by CTV News
   There is a Facebook page and a Twitter Feed

http://carma.newcastle.edu.au/jon/blogs.html

Know the Audience and use Pictures







And Other Expository Writing

- ✓ For Ourselves and for Others

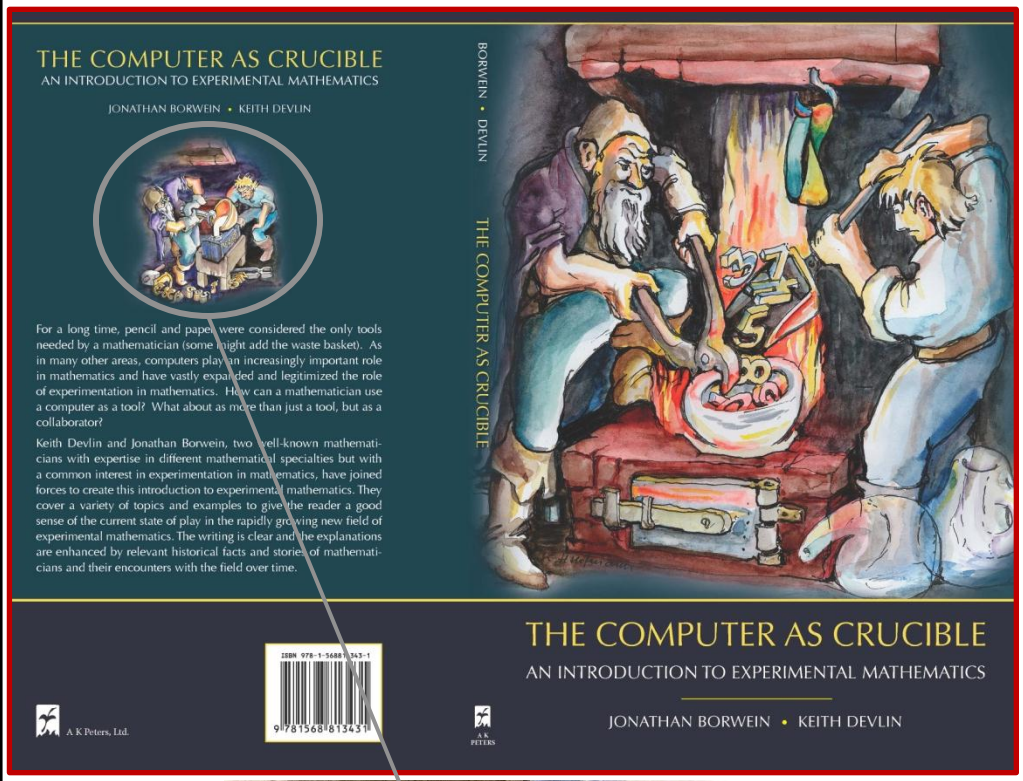
Take Risks. The Demand is There

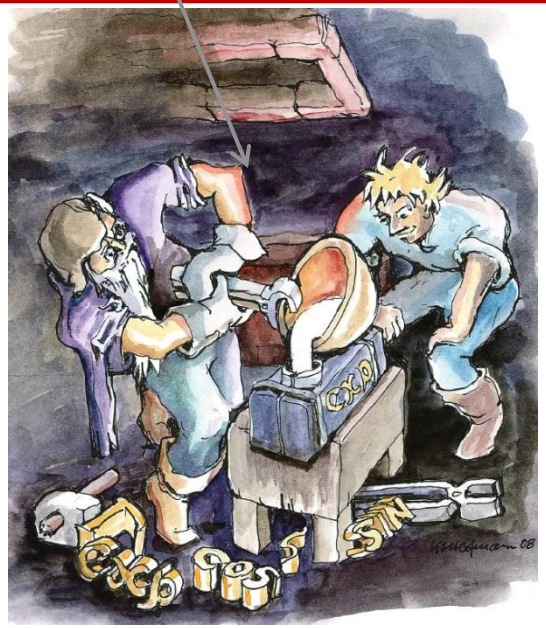
- Talk to me if you want to try out a topic
- For Blogs, MAA Monthly, Intelligencer, …
  - ✓ Have story to tell and defensible opinions
  - ✓ Use simple declarative sentences
    - ✓ And short paragraphs!
  - ✓ Titles are important. Some are failures:
    - ✓ Danger of death: are we programmed to miscalculate risk?

The Benefits are Great and it is FUN

Lots of readers and feedback: (1-2% comment or tweet or …)

- ✓ AMM has 100,000 readers (hand-overs)
- ✓ *Conversation:* 17 articles, 46,062 readers, 265 comments
- ✓ My online *lectures* get 100-fold as many readers as in-person
- ✓ 2012 PiDay in *HuffPost*: 18,218 f likes, 1625 f shares, 119 tweets, …





Jonathan Borwein
Keith Devlin

with illustrations by Karl H. Hofmann

Contents

AK Peters 2008 Japan & Germany 2010

“Cookbook” Mathematics

- ✓State-of-the-art machine translation
- ✓math magic melting pot
- ✓full head mathematicians
- ✓No wonder Sergei Brin wants more

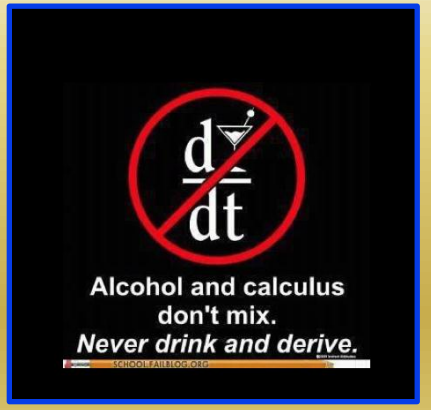
Even best selling authors do not control foreign editions or covers – Stephen J. Gould (1941-2002)

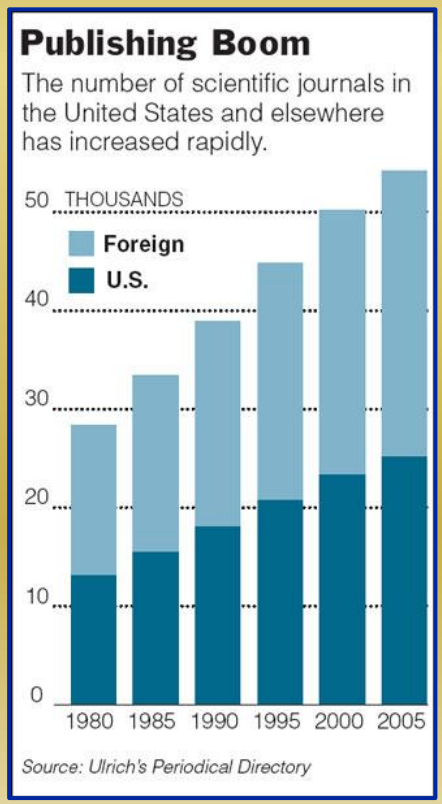
Final Diffuse Musings

Changing Cognitive Styles

- ✓ Stroop effect
- ✓ “Strategic reading”
- ✓ Wolfram Alpha

16.23 petaflop Sequoia at LLL



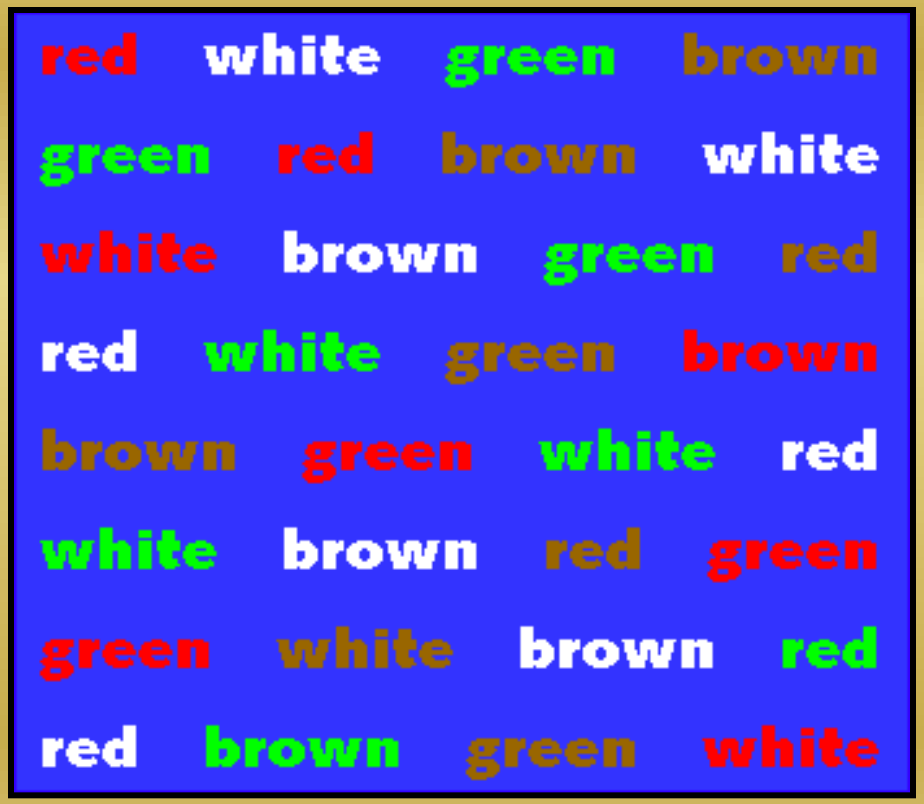


Moore’s Law is Still in Effect

- ✓ The media will look very different in ten years
- ✓ Human beings will not

Changing User Experience and Expectations

What is attention? (**Stroop** test, 1935)



1. Say the **color** represented by the **word**
2. Say the **color** represented by the **font** color

(young) multi-taskers perform #2 easily and are (too) good at suppressing information?

Hypnotism works: *Sleight of mind*

http://www.snre.umich.edu/eplab/demos/st0/stroop_program/stroopgraphicnonshockwave.gif

Acknowledgements: Cliff Nass, CHIME lab, Stanford (interference and twitter?)

Other Cognitive Shifts

Harwell 1951-1973

✓ They were right, pre iPad !

Science Online August 13, 2009

Strategic Reading, Ontologies, and the Future of Scientific Publishing

Allen H. Renear* and Carole L. Palmer

The revolution in scientific publishing that has been promised since the 1980s is about to take place. Scientists have always read strategically, working with many articles simultaneously to search, filter, scan, link, annotate, and analyze fragments of content. An observed recent increase in strategic reading in the online environment will soon be further intensified by two current trends: (i) the widespread use of digital indexing, retrieval, and navigation resources and (ii) the emergence within many scientific disciplines of interoperable ontologies. Accelerated and enhanced by reading tools that take advantage of ontologies, reading practices will become even more rapid and indirect, transforming the ways in which scientists engage the literature and shaping the evolution of scientific publishing.

✓ Potentially hostile to mathematical research & teaching patterns

Moore's law. This picture is worth 100,000 ENIACs

The number of **ENIACS** needed to store the 20Mb TIF file the Smithsonian sold me

THANK YOU