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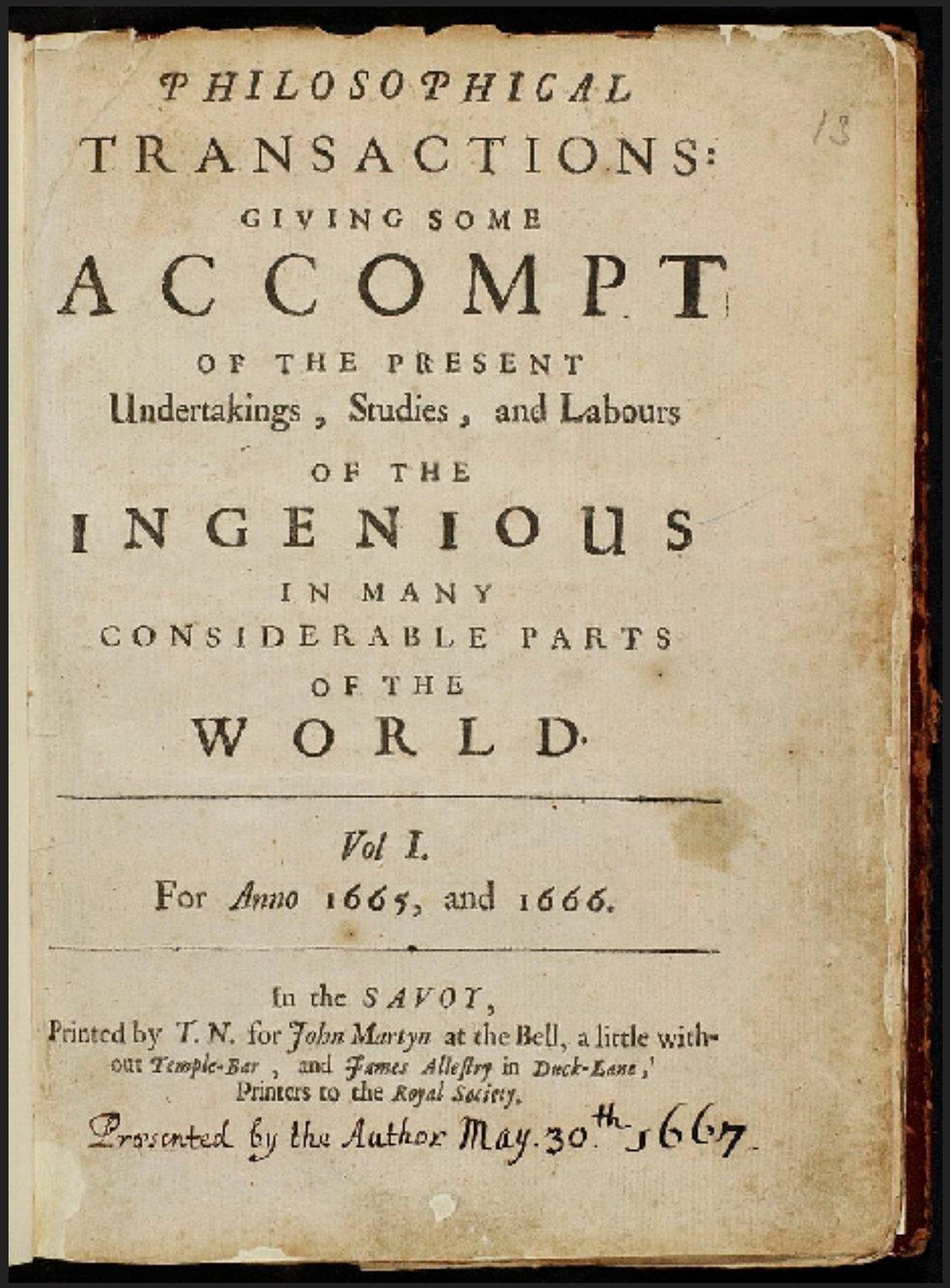
A CONVERSATION ON

HYPERPAPERS & OPEN CO-AUTHORING

caida

SCIENTIFIC PUBLICATIONS

- 1665 - First Scientific Journal
- Goal: communication of Science
- Encouraged the critical examination of ideas independently of who said them.
- …. where are we now?



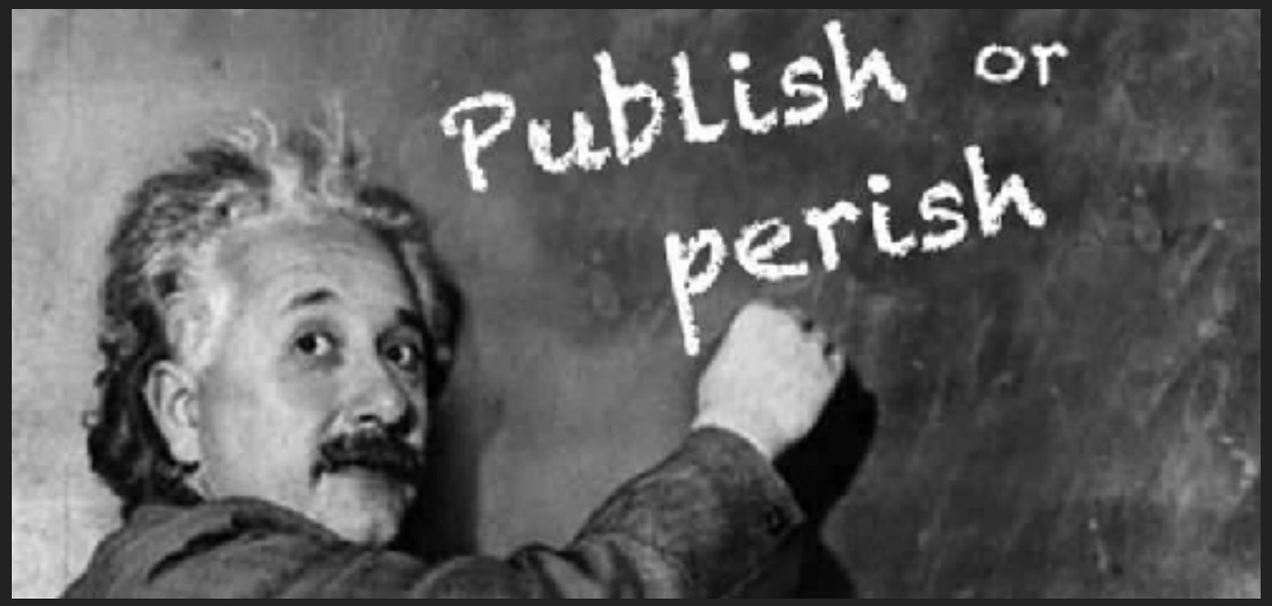
PHILOSOPHICAL
TRANSACTIONS:
GIVING SOME
ACCOMPT
OF THE PRESENT
Undertakings, Studies, and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD.

Vol I.
For *Anno* 1665, and 1666.

In the *SAVOY*,
Printed by *T. N.* for *John Martyn* at the Bell, a little without *Temple-Bar*, and *James Allestry* in *Duck-Lane*,
Printers to the *Royal Society*.
Presented by the Author May. 30th 1667.

PUBLISH OR PERISH & FRIENDS..

- When governments started funding research, publications slowly transitioned from an innovative means to share findings to take on the role of a yardstick for pedigree and credibility.
- Is the “global paper machine” fully optimized for the good of science (and education)?
- Have we struck the right balance between secrecy and openness?
- Are there new opportunities from modern technologies that we should consider?



IS IT GOOD FOR SCIENCE?

- #1 - Ideas are kept secret until paper is published
  - If you never finish your paper nobody will see your idea
    - ideas are abandoned / others will have to start from scratch / you don't get credit
  - A solution is investigated by a very small group of people
    - would we get better science if we had more minds at work? (any *science* about it?)
  - Access to cool investigations is restricted to elites
    - what about democratizing science / education / recruiting
  - Can we encourage more openness and collaborative attitude?

IS IT GOOD FOR SCIENCE?

- #2 - Ideas/Results are not reproducible
  - lower chance of finding errors!
  - harder to validate under new assumptions/scenarios
  - harder to continue work
  - harder to compare your results to “state of art”
  - Loss for education
  - Your results might already hide more findings

IS IT GOOD FOR SCIENCE?

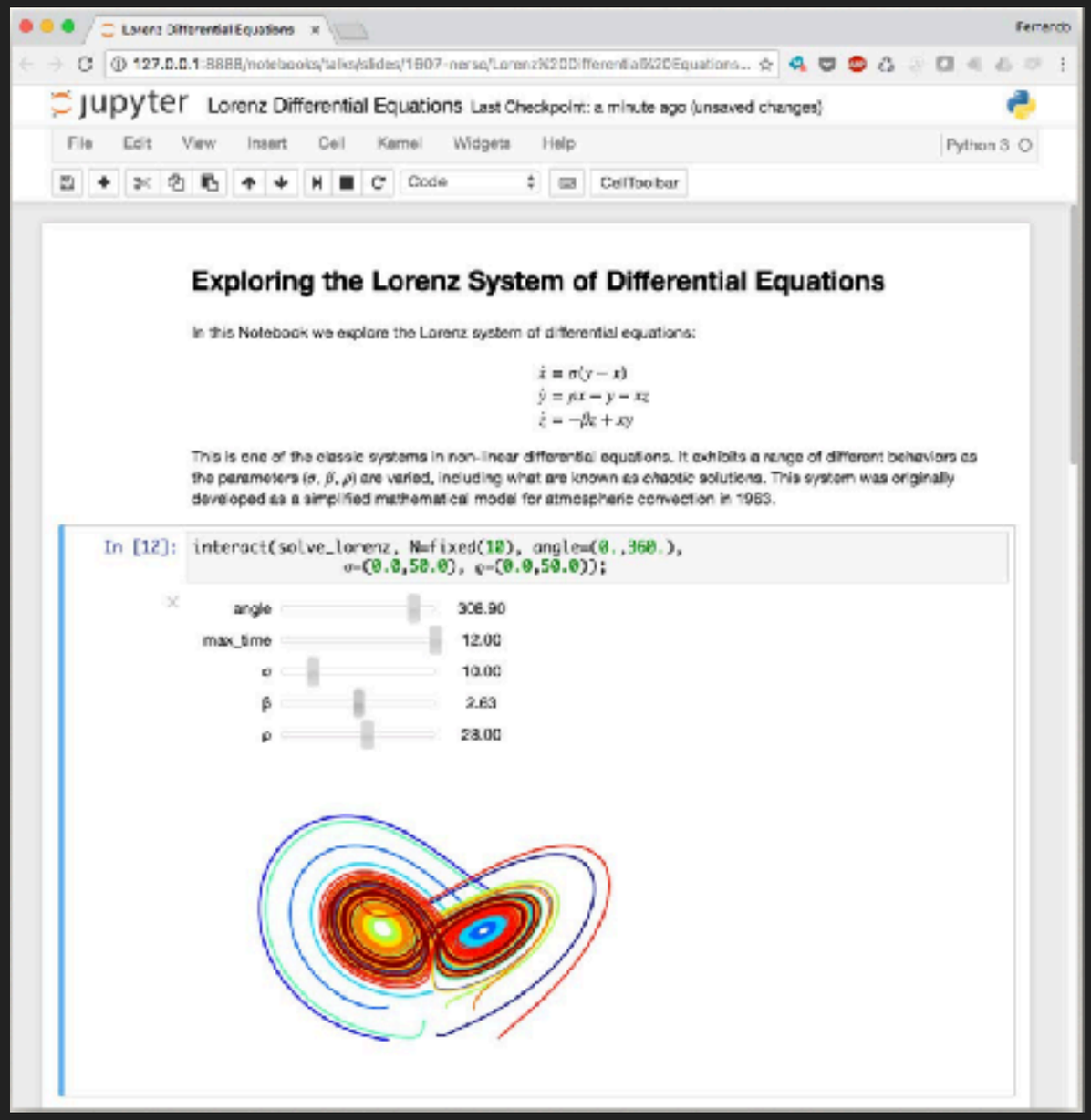
- #3 - Novel is sometimes over-emphasized
  - Students obsessed with “new”. Will avoid working on improving results. Ideas are abandoned (see also reproducibility)
  - *cost vs benefit* is unbalanced because of reproducibility issues
  - Are we teaching that incremental is bad? Isn’t science incremental most of the time? Isn’t continuity relevant? (e.g., for measurement infrastructure)

IS IT GOOD FOR SCIENCE?

- #4 - Fixed-layout flat documents + Page limit + Supplemental material often not easy to use
  - Papers were designed to be clear and concise and deliver essential info. Can we preserve that but do more today? A ***"hyperpaper"*** maybe:
    - Embedded (access to) code and data
    - Support many ways to represent same data
      - Different representations, Animations, Interactive Viz, Transformations, …
    - Folding text
    - Easy to add comments and argue
    - Easy to "branch"

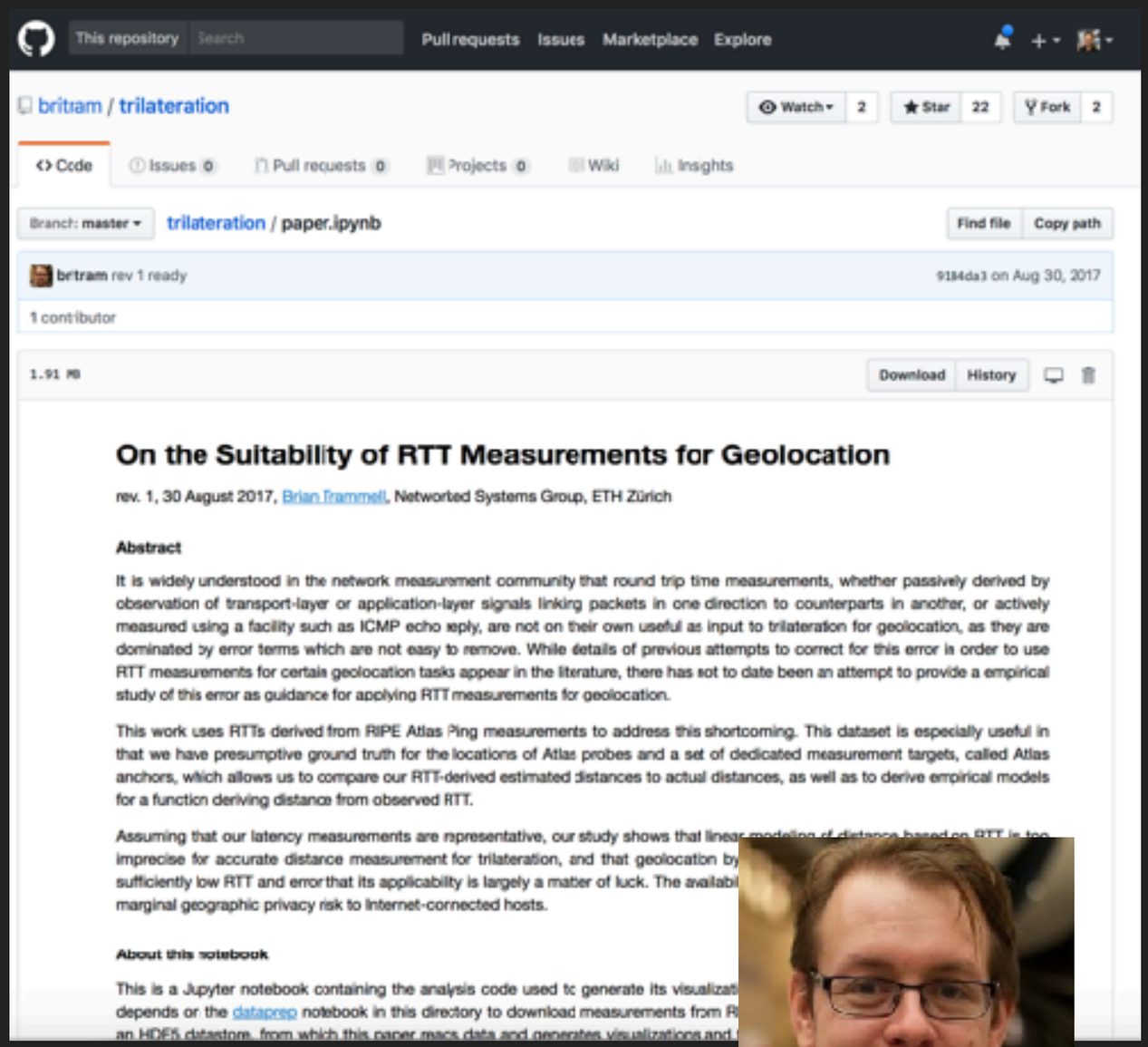
HYPERPAPER TECHNOLOGY EXISTS

- iPython / Jupyter / Jupyter Lab ..
- A web-based interactive computational environment for creating Jupyter notebooks.
- a document format for publishing code, results and explanations in a form that is both *readable* and *executable*.
- Check out BinderHub



JUPYTER-BASED PAPERS EXIST

- https://github.com/jupyter/jupyter/wiki/A-gallery-of-interesting-Jupyter-Notebooks#reproducible-academic-publications
- Even a network measurement paper!
- Isn't our Internet Measurement community ideal to experiment with this tool?



https://github.com/britram/trilateration/blob/master/paper.ipynb

IDEAS TO EXPERIMENT WITH

IMAGINE AN EXPERIMENT: IMC ’19 OPEN COLLAB HYPERPAPERS

- look for agreement with IMC PC/SC
- We set up a platform, with storage, computing power, etc..
  - Modified Jupyterlab with GitHub support + slack etc.
- [-6mo] An incubation bootcamp (hackathon style)
- [after bootcamp] Anybody in the world can contribute and become co-authors. Entire paper development is transparent and logged.
- [– 2weeks] Stop accepting new co-authors
- [deadline] Hyper-paper is submitted

OPEN COLLAB HYPER PAPER EXPERIMENT — DETAILS

- High-level technical rules and ethical guidelines
  - including rules about authorship, etc.
- Teams formed during the bootcamp are paper leaders
- Teams can define additional/more granular rules if consistent with general rules and ethical guidelines
- not easy to implement - lots of challenges to solve

POST A NETWORK MEASUREMENT STUDY CHALLENGE

- Just heard about the Polymath project
  - massively collaborative mathematics proven fruitful.
- Tim Gowers, 2009


Mathematical Advances: Lone or Massively Collaborative Endeavors?

The practice of mathematics is changing. While in the past mathematics was predominantly a solitary effort, now it has become increasingly collaborative. How does this growing inclination for teamwork translate on the Internet and what benefits and challenges does it bring?

In early 2009, Timothy Gowers, a Professor at the University of Cambridge, launched a "polymath project" on his Blog (http://gowers.wordpress.com), an attempt to find solutions to mathematics problems through the collaboration of many individuals online. The problem Gowers posted sought an elementary proof of a special case of the density Hales-Jewett theorem. A little more than a month later, Gowers announced that the polymath participants—including Terence Tao, a Professor at the University of California, Los Angeles—had found an elementary proof of the special case that, surprisingly, could be generalized to prove the full theorem.

In October, Gowers spoke about the use of the Internet as a medium for solving mathematical problems and led a discussion that included Peter Sarnak, Professor in the Institutes' School of Mathematics, who presented a response to Gowers's remarks. The occasion was the inaugural meeting of the Institute's School of Mathematics Council, which has been formed to help disseminate the work of the School and extend the range of its supporters. Council Chair Neil Chriss, a former Member (1994–95) in the School and the founder of Hutchin Hill Capital, was the host of the meeting at the Core Club in New York City. In addition to Sarnak, Institute participants were Noga Alon, Visiting Professor; Pierre Deligne, Professor Emeritus; Robert MacPherson, Professor; Peter Goddard, Director; Robbert Fernholz, Martin Leibowitz, and James Simons, Trustee and Charles Simonyi, Chairman of the Board. Additional participants were former Member Gil Kalai, a Professor at the Einstein Institute of Mathematics at the Hebrew University of Jerusalem, and former Member John Morgan, Director of the Simons Center for Geometry and Physics at Stony Brook University. Guests included mathematicians who had pursued careers in finance or business.

The polymath Blog

The Polymath Blog (http://polymathprojects.org) enables anyone anywhere to find solutions to mathematical problems through online collaboration.

Among the advantages of a collaborative online approach, said Gowers, are the speed with which problems can be solved—in the case of the Hales-Jewett theorem, a matter of six weeks rather than several years—and the blog's working record of the mathematical process, showing how ideas grow, change, improve, or are discarded. In addition, different perspectives are encouraged and unanticipated connections are formed. Gowers cited authorship as a challenge—at least initially, polymath papers will be signed with the group pseudonym DHJ. Polymath's along with a link to the working record—or perhaps one that individual contributions are transparent on the Blog and that letters of recommendation could aid in assessing achievements. Using as an example the love and long labor of Andrew Wiles, a Visitor in the School and a Trustee of the Institute, that enabled his proof of Fermat's Last Theorem, Gowers acknowledged that the polymath blog is a departure from the "romantic side of mathematics" wherein a single mathematician toils away in solitude.

Sarnak congratulated the efforts and results of Gowers's polymath blog, but presented a skeptical view of online collaboration, questioning, "Is the aim of mathematics to solve as many problems in as short amount of time as possible?" Aside from favoring traditional "mom and apple" mathematics, Sarnak also listed whether a polymath method would lead to new and interesting theorems or the identification of central problems. Additionally, if the polymath model were to grow to dominate mathematics, Sarnak posited, younger mathematicians would be driven in the direction of online collaboration at the cost of traditional mathematics, which has produced the likes of Alexander Grothendieck, whose individual contributions to the field have been revolutionary.

After Sarnak spoke, the discussion was opened to a round table of participants and guests over dinner. A lively conversation ensued with Allen commenting that it will be interesting to see how Internet collaborations evolve and MacPherson expressing a belief that "the more approaches you have, the better it is for mathematics." Kalai, who recently launched a polymath project to solve a problem about polytopes and linear programming that he/she/it/ working on for two decades, opined that "there is no danger and no hope" that online collaboration will supersede lone endeavors and advocated the approach's usefulness and altruistic nature. Referring to pitching her Artistic Margarita, the George B. Kennan Professor at the Institute, Kalai said, "Margulis taught us that science is the art of looking under the lamp. Polymath is a new such lamp."

https://polymathprojects.org

POST AN UNFINISHED STUDY ON YOUR WEBPAGE

- use it for recruiting
- use it as an experiment
- use it to get feedback
- use it to find random collaborators
- ...

meaningless image

THANKS!

science in the 21st century

REMEMBER TO PUBLISH . . .

science in the 21st century