

Social Graphs in Mathematics

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CONTENTS

1. The Social Problem Poser: Paul Erdős
 2. The Social Game Theorist: John Nash
 3. The Social Logician: Bertrand Russell
 4. The Social Theorem
 5. The Social Protocols
 6. The Social Software
- References

1. THE SOCIAL PROBLEM POSER: PAUL ERDÖS

Paul Erdős travelled the world with one motivation: pose and solve as many mathematical questions and problems with as many mathematicians as possible. Although I never met Paul Erdős, I know his motivation was noble. Paul Erdős was not motivated by spotlight or by money, he was mostly concerned with the chance of gaining mathematical knowledge for as many mathematicians as possible around the world during his life span.

Film: N Is A Number (1993).

Paul Erdős, a wandering mathematician and genius of posing new problems, was expanding his social graph wherever he travelled and met new mathematicians. A short period in the life span of Erdős is documented in “N Is A Number: A Portrait of Paul Erdős” (1993) by *George Paul Csicsery*.

Social Graphing.

If every human, each a potential mathematician, owned at least a pen and ink, a pencil with a rubber gum, and blank pieces of paper to express time, space, compute numbers and write essays, and enough books to study many kinds of knowledge, not just mathematics, the problems in “Erdős legacy of unsolved problems” would be faster to prove and the number of unsolved problems will also increase.

If we gather at least one conference every year like Erdős, we’ll build a better society and world for all human beings.

We must protect our earth from a nuclear attack and every other kinds of terrorist attacks every minute, and every hour until the message of peace and equality is reached to every human on this planet. The world should not judge anyone by how they look, but how they behave and what they do to help other human beings to study mathematics.

Mathematicians must therefore stand firmly together since mathematics is a mental activity and is meaningless without other mathematicians.

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Mathematicians should never give in to any evil force that can take place in human nature if one becomes anti-social. Mathematicians should work on reducing the volume of weapons and increase numbers of pens with ink, pencils and paper, or cheap computer components, where there is electricity.

Especially in rural places without electricity, young, potential mathematicians must have enough pens with ink, pencils and paper. Mathematicians must also make sure that every child are sent to school and college, and learn true mathematical knowledge, instead of faith, so that they can move to a richer society and provide those with more knowledge about mathematics to younger people. Children should be able to go to school, instead of working for their family, but the teacher should make sure that the family of the child get money in compensation for the lack of income when they send the child to school, so that they can encourage more people to send their children to school, thus enlighten and become teachers in their old community.

Mathematicians should, like medical doctors, protect life everywhere.

2. THE SOCIAL GAME THEORIST: JOHN NASH

Nash equilibrium.

Professor John Nash suggested a game theory with a special equilibrium.

Nash argued that there is equilibrium in a game that involve two or more players, in which each player is assumed to know the equilibrium strategies of the other players, and no player has anything to gain by changing only his or her own strategy unilaterally.

1994 Nobel Laureate.

Unfortunately, Professor Nash suffered of paranoia and malnutrition, so the community didn't listen until the early 1990s, when the Nobel committee in Stockholm awarded John Nash the Nobel Prize in Economic Sciences in 1994.

Film: A Beautiful Mind (2001).

The film "A Beautiful Mind" (2001), directed by Ron Howard, was based on true events from the life of John Nash.

3. THE SOCIAL LOGICIAN: BERTRAND RUSSELL

Bertrand Russell, a British mathematician worked on the logical foundations of Mathematics. Along with *Alfred North Whitehead* he wrote "Principia Mathematica".

Russell was strongly against war, religion, Nazism, colonialization, Soviet totalitarianism, nuclear proliferation, the U.S. involvement in the Vietnam war, and for free trade, idle moments and knowledge.

Bertrand Russell is an archetype on the social math graph.

4. THE SOCIAL THEOREM

Social Theorem. *Whenever a mathematician meets another mathematician in a point on the social graph, they will either ignore each other, produce a new proof, occasionally a new mathematician, or define a new conjecture.*

Film: Proof (2005).

John Madden directed *Proof* (2005), based on the Pulitzer Prize winning play by *David Auburn*. The daughter of a brilliant, but mentally disturbed mathematician, recently deceased, has to face her inheritance and a former student of her father.

5. THE SOCIAL PROTOCOLS

Two-way communication. *We must work on enlightening new mathematicians everywhere about the important about true knowledge, and provide theorems that can not be disputed by anyone. However, we must ensure that we do not become robots, so the communication through computer must be a two-way dialogue, so that both the audience and the speaker can ask questions during the session, to avoid a meaningless two-way monologue.*

Human protocol. *Humans follow certain protocols when they communicate an idea or discuss a problem. Mathematicians are no exceptions. Mathematicians expect peers to follow certain social group codes in order to collaborate such as using \TeX to write mathematical papers or to advocate academical freedom and social ideals.*

Hypertext Transfer Protocol. *To manage copies of web pages, computer software, both client and server, adhere to the Hypertext Transfer Protocol (HTTP) published by the Internet Engineer Task Force (IETF). HTTP is the prime example of a social computer protocol.*

Picture Transfer Protocol. *In 2001 a social protocol for digital cameras, the Picture Transfer Protocol (PTP, PIMA 15740, ISO 15740), motivated by the American film manufacturer and photography vendor Eastman Kodak, Inc. and the Photographic Image Manufacturers Association (PIMA), was established as a new industry standard protocol for digital still photography devices and acquisition software.*

Human protocols.

Mathematicians can encourage meetings using the social software, but also advocate that people must meet each other face to face at least once a year, so that people do not isolate themselves from the world where no computers are available.

Therefore, we must preserve the humanity towards others, so that we do not forget that every person has a right to live a peaceful life doing math and the we must respect all people's rights to state one opinion, although we may strongly disagree in those opinions.

As mathematicians, we must listen to each other and possibly argue against all kinds of tyrannies, both police, military, religion or social injustice where innocent human beings loose their lives.

6. THE SOCIAL SOFTWARE

The best social software project to work on currently is Ubuntu, a free operating system that runs stable and works on most computers worldwide. Ubuntu is shipped with X, a graphical screen rendering system, and \TeX , Professor Knuth's typography system to prepare mathematics for journals and conferences on a computer.

Ubuntu.

Ubuntu is a free and open source operating system (SOS) for modern computers. It is also a word that means "humanity towards others".

The Ubuntu operating system is available for free from <http://www.ubuntu.com/>. Currently it is possible to ask for a gratis copy of the latest Ubuntu Desktop version shipped on CD-ROM for no cost at <http://shipit.ubuntu.com/>

Ubuntu is resistant to computer viruses and an excellent choice for writing mathematics in \TeX and performing accurate calculations and graphs using Genius (by *Jiri Lebl (J.L. Doob Research Assistant Professor, University of Illinois at Urbana-Champaign)*).

Film: Live Lecture Streaming. *Ubuntu* users are now capable of streaming social graphs from one to another location by using *icecast2*, *ffmpeg2theora*, *Ogg Vorbis* and *Ogg Theora*, *dugrab* with a video camera source over Firewire or USB 2.0, and finally *dvswitch* which lets the stream operator mix the stream content between the video camera source and a software application, for example the Genius by *Jiri Lebl (J.L. Doob Research Assistant Professor, University of Illinois at Urbana-Champaign)*. That means that it is possible to both broadcast and listen to lectures worldwide using Ubuntu, given enough bandwidth and coordination by members in your current social graph.

REFERENCES

N Is a Number: A Portrait of Paul Erdős (George Paul Csicsery, 57 min, 1993)
Erdős on Graphs - His Legacy of Unsolved Problems (A K Peters, Wellesley, Massachusetts, 1998)

Genius Mathematics Tool and the GEL Language available from <http://www.jirka.org/genius.htm> ■