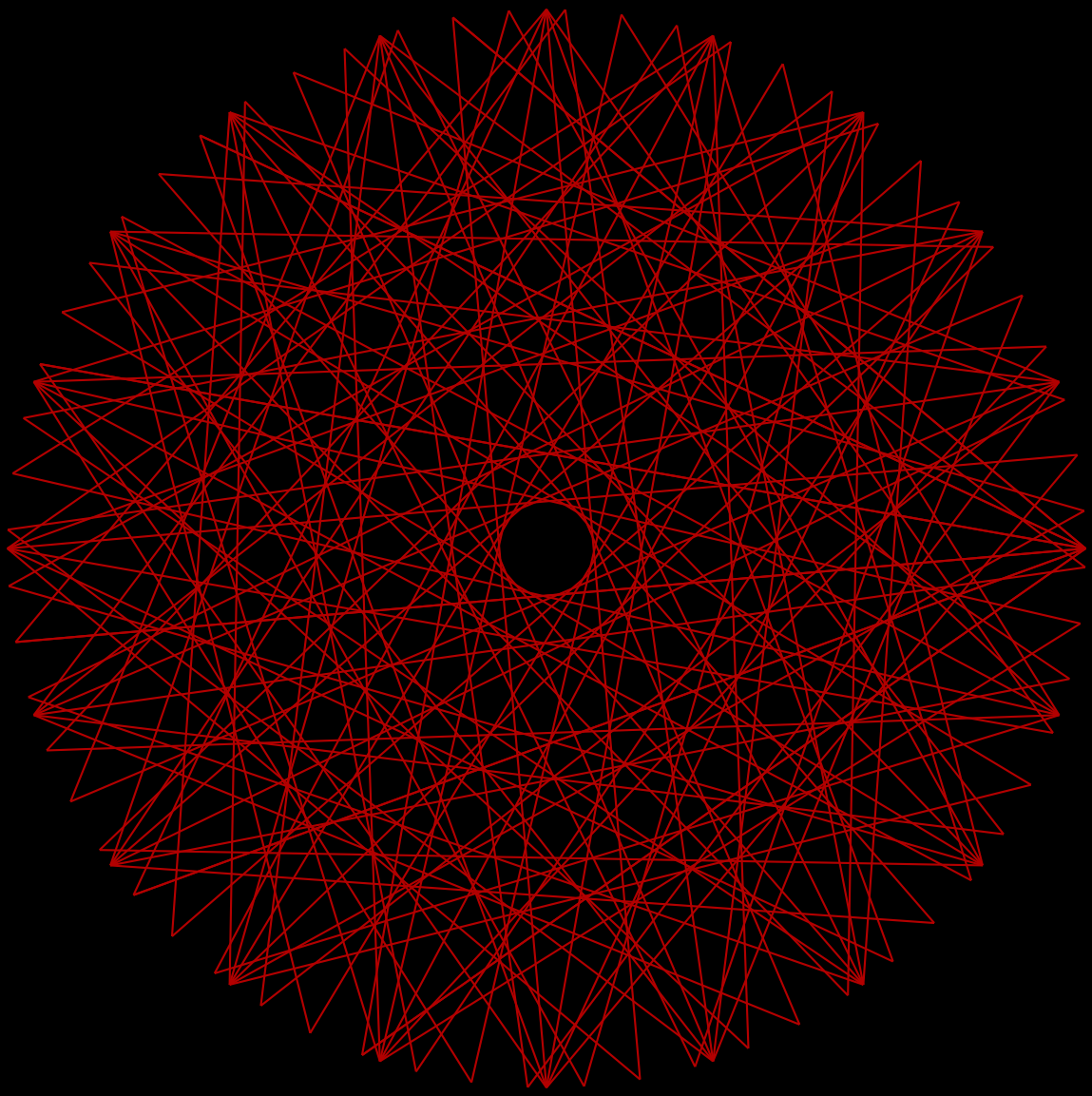
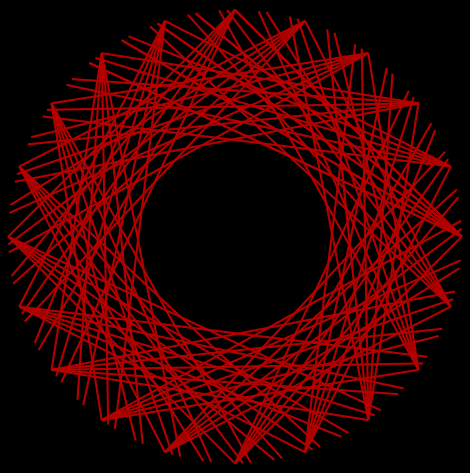
Project Proposal



Romanian Structuralism

2021.12.02



This proposal was written and typeset by Graham Joncas.

If you would like to support this project, you can contact me on twitter (@gjncs) or linkedin.

To see a portfolio of my writing and research, visit my personal website at gjoncas.github.io

Outline

Digital humanities, far from fusing the best ideas of mathematics and literary analysis, instead gives us the worst of both, where research becomes an exercise in using the same two or three tools to answer questions that everyone knows anyway. Mathematicians don't bother with text analysis due to its lack of open problems, while literary critics don't bother with computers due to the lack of insight they bring.

The best glimpse at this lost future of how the humanities could have been – but can still be – comes from an obscure school of thought in Romania. Though they wrote in the 1970s and '80s, the methods they pioneered put to shame those used today. Led by Solomon Marcus, their approach applied formal language theory not just to linguistics, but also to poetry, theatre, music, and beyond. This, in turn, opened up striking connections with further branches of math, presaging today's most cutting-edge developments such as topological data analysis.

There should be a book that explains these ideas — and the present proposal outlines the first such book in any language. Its tentative title is *The Romanian Structuralists*, after the French school that dissipated into post-structuralism, passing its baton to the unlikeliest of places.

I am looking for a research or cultural grant so I can spend a year on writing this book. These funds will cover cost of living, purchase of scholarly materials, and plane tickets.

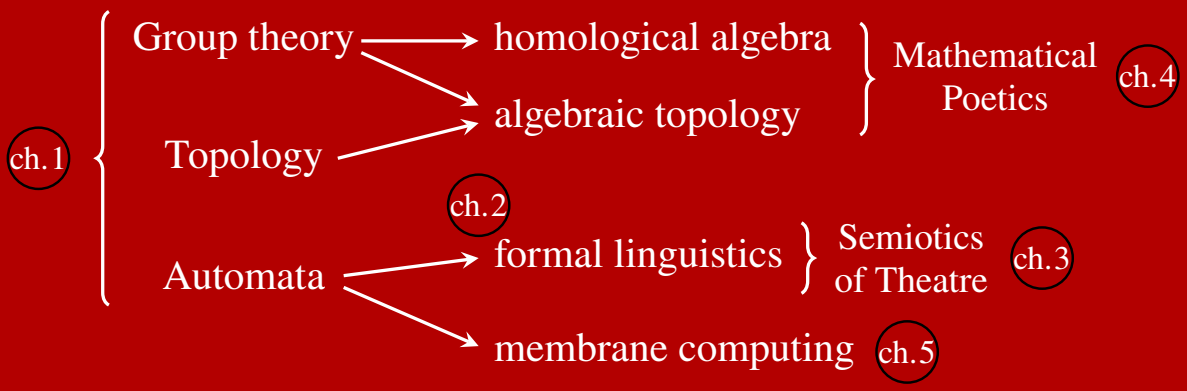
This work could also serve as the basis for a Ph.D thesis, in a sufficiently interdisciplinary program. I am open to this, as long as the time commitment is reasonable (1-3 years).

Benefits

This research aims to bring a new toolbox to humanities researchers, providing a foothold to think computationally about poetry, theatre, and cultural studies. In principle, these methods can apply to any form of natural language processing, giving new ways to analyze text data.

More pragmatically, the work of Gheorghe Păun applies these same ideas in managerial economics, to formalize manufacturing processes. His later research bears upon computational biology, and even offers a new paradigm for computation inspired by cellular biology.

Keywords: digital humanities, semiotics, formal language theory, algebraic topology, natural language processing



1. Formal Languages

Automata theory represents computations as a stream of inputs, written as letters in a formal language. Based on the rules they allow, such grammars have different levels of complexity, by which we can measure a task's difficulty. This chapter is a tutorial introduction to the mathematics used in the rest of the book.

2. Algebraic Linguistics

Formal grammars view language as streams of text, rather than using sentences as their main unit. As well as typical morphemics, the mathematics further lets us incorporate pragmatic details such as adversarial dialogue, language learning, and topological continuity of synonyms that are closer or further in meaning.

3. Semiotics of Theatre

Ancient plays are highly stylized, where for instance a conflict is always followed by a lament. Scenes are thus segmented into repeating types of events, and the rules for recurrences across plays form a grammar. This lets us compare theatrical conventions and dramatic complexity across disparate times and cultures.

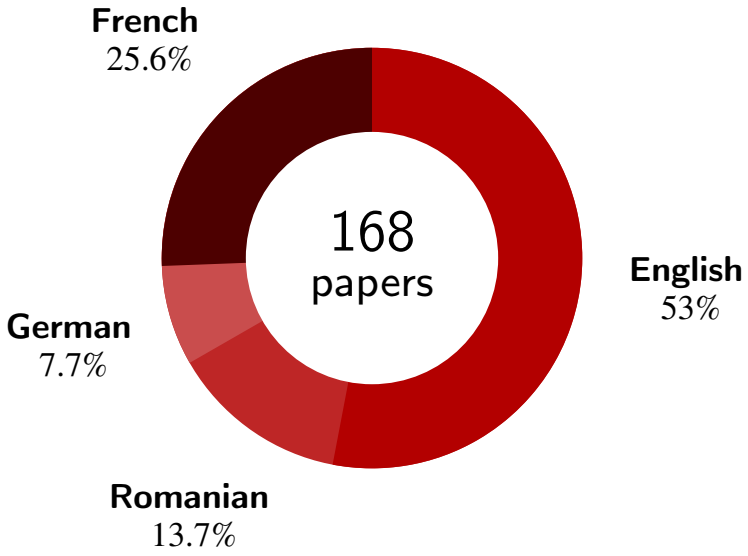
4. Mathematical Poetics

It is often said that poetry is untranslatable; yet, a given translation may capture one dimension of a poem. Following this metaphor, examining multiple translations offers insights into the 'geometry' of a poem. Algebraic topology thus lets us stitch these structure-preserving transformations into a continuous whole.

5. Membrane Computing

It was thought early on that formal languages could capture properties of molecular genetics, as in DNA. Generalizing further, computation itself can be modeled after biological cells, where a 'P system' is a formal language whose rules emulate chemicals reacting to each other as they move across cell membranes.

Objectives



Monograph

This will be the first book on the Romanian school of semiotics, synthesizing insights from 168 books & papers, many of which have never appeared in English.

Software

An open-source software package will accompany the book's release, bringing new tools for humanities researchers and new problems for mathematicians.

Outreach

These ideas are well-suited for seminars, tutorials, and data visualizations, making digital humanities easier to motivate for newcomers.

"I am dreaming of a world where poets will make as many steps towards mathematics as Solomon Marcus made towards poetics." ~Ana Blandiana

Mathematics

The reason no-one else has written this book is that digital humanities has never used this math, while no mathematician would slog through so much literature. A novel approach is just sitting there, but nobody is willing to do the dirty work.

Learning the math is the major difficulty of this project, as it uses continuous tools of topology to extend the discrete framework of automata, fusing together pure and applied mathematics.

Languages

Another barrier is that half of the literature is in French, German, and Romanian, with few non-Romanians conversant in all three. Happily, Romanian has 71% lexical similarity with French, making it feasible to gain a reading knowledge.

Writing this book also requires tracking down many obscure papers, along with interviewing retired scholars now in their seventies or older, before the chance to do so disappears forever.

Qualifications

Education

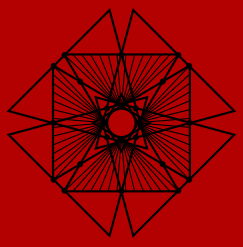
My background is in economics, where I have a BA from Western University in Canada and an MA from Fudan University in Shanghai.

I research computational economics as well as formal approaches to philosophy, seeking out new ways to express concepts in math and then generalize them in radical new directions.

Relevant Skills

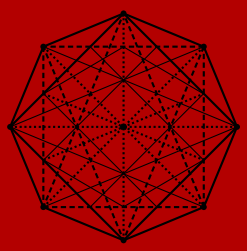
- Versed in the Haskell programming language, which offers strong mathematics packages as well as supporting analysis of textual data.
- Fluent in Mandarin Chinese (HSK 5), with reading proficiency in French and German.
- Expert in typesetting and data visualization in LaTeX, allowing clear illustrations of material.

"Every week Graham Joncas smokes a different kind of crack." ~Josué Ritter



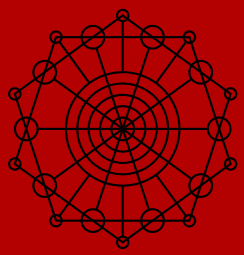
Ultrametric Psychoanalysis

Interpreting the unconscious through non-Archimedian geometry and p-adic numbers



Algebraic Semiotics

Mechanizing semiotic morphisms as mappings between sign-systems



Computational Egregorics

Multiagent models of the mind where humans swap internal representations like tokens

Budget

Many of the materials I need have been digitized by librarians at the University of Iaşi. However, one key journal is only digitized back to 1976, and other periodicals are not available at any library in Canada. Still others are only published in edited volumes.

Hence the budget accounts for gathering and purchasing scholarly documents, which requires traveling to Romania, along with living expenses and publication fees.

Budget Item	**Cost (CAD)**	
Plane ticket, round trip	1,000	May change after COVID
Cost of living (Romania) → $300/mth × 3	900	
Rent (Romania) → €300/mth × 3	1,300	
Cost of living (Canada) → $400/mth × 9	3,600	Can save $2,500 by staying in Romania for the full year
Rent (Canada) → $600/mth × 9	5,400	
Fee for long-stay visa (€120)	172	Omit if staying <3 months
Book purchases	500	
Library card + fees	128	
Publication expenses	2,000	
Total	**15,000**	

Assumptions

- I will work at this project full-time, for 60+ hours per week, until it is completed
- The goal is to publish this at a major academic press, e.g. Springer or Routledge
- Proceedings will help fund a future book project, on economics and philosophy

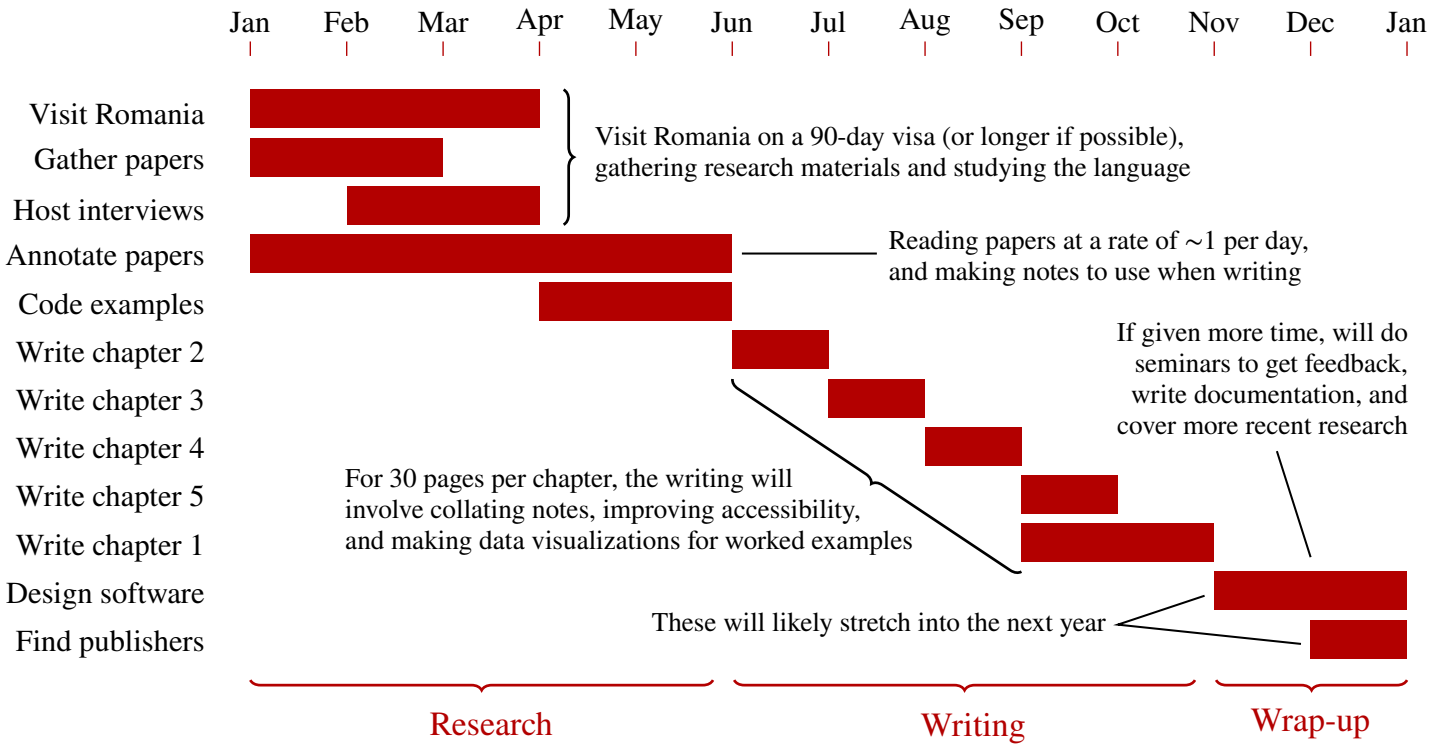
Funding Options

1. Get funding in Canada, take a year off and visit Romania on a tourist visa
2. Get a cultural grant from Romanian government and spend the year there
3. Get a job in Romania on a work visa and do this project in my spare time
4. Do a Ph.D at a Romanian university and get a study visa for 12+ months
5. Do a Ph.D program elsewhere, visit Romania as part of study program

Timeline

While one year is a very ambitious time frame, it should be feasible as long as I've prepared in advance by doing the mathematics, mastering French and German, and extending my domain knowledge of literature, poetry, and theatre.

Another way to prepare for project is building my platform via Twitter and my blog, posting on how to apply math in the humanities. I can also target social media in China, analyzing Chinese plays and poetry as illustrations.



Target audience

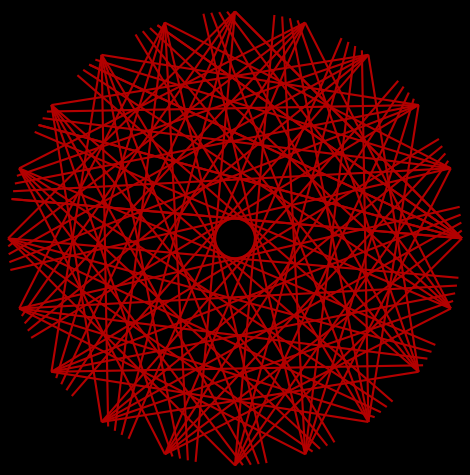
This book will appeal to coders and scientists with an interest in literature, as well as admirers of the humanities who want to see how computers can bring new insights to literature & poetry.

Similar works

- *Graphs, Maps, Trees: Abstract Models for Literary History* (2005), by Franco Moretti
- *Synthetic Philosophy of Contemporary Mathematics* (2012), by Fernando Zalamea

Success metrics

- Book sales & downloads
- Citations & book reviews
- Web traffic & social media
- Software package users
- Increased public awareness of Romanian literature



Advisors

Person #1

Person #2

Person #3