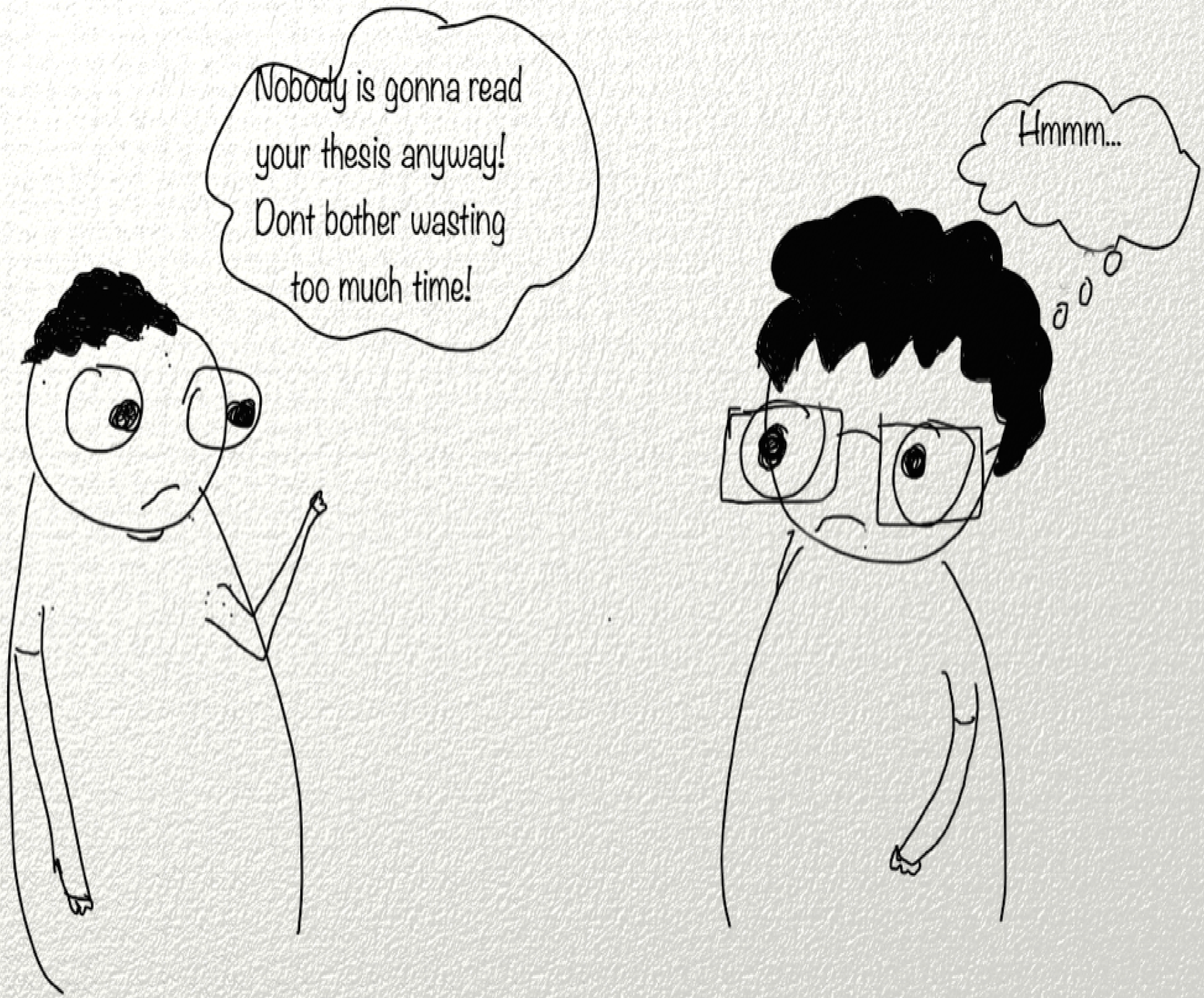
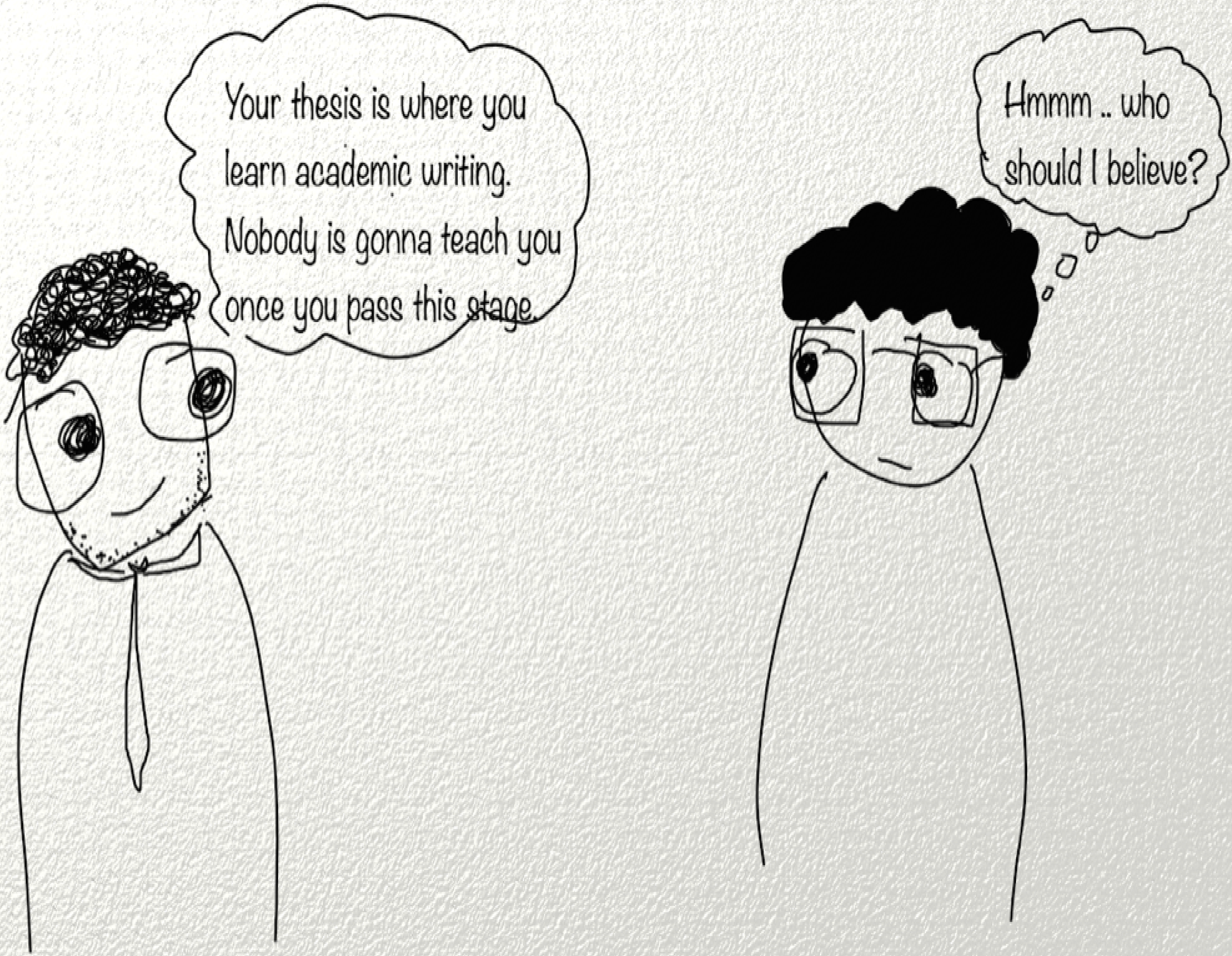
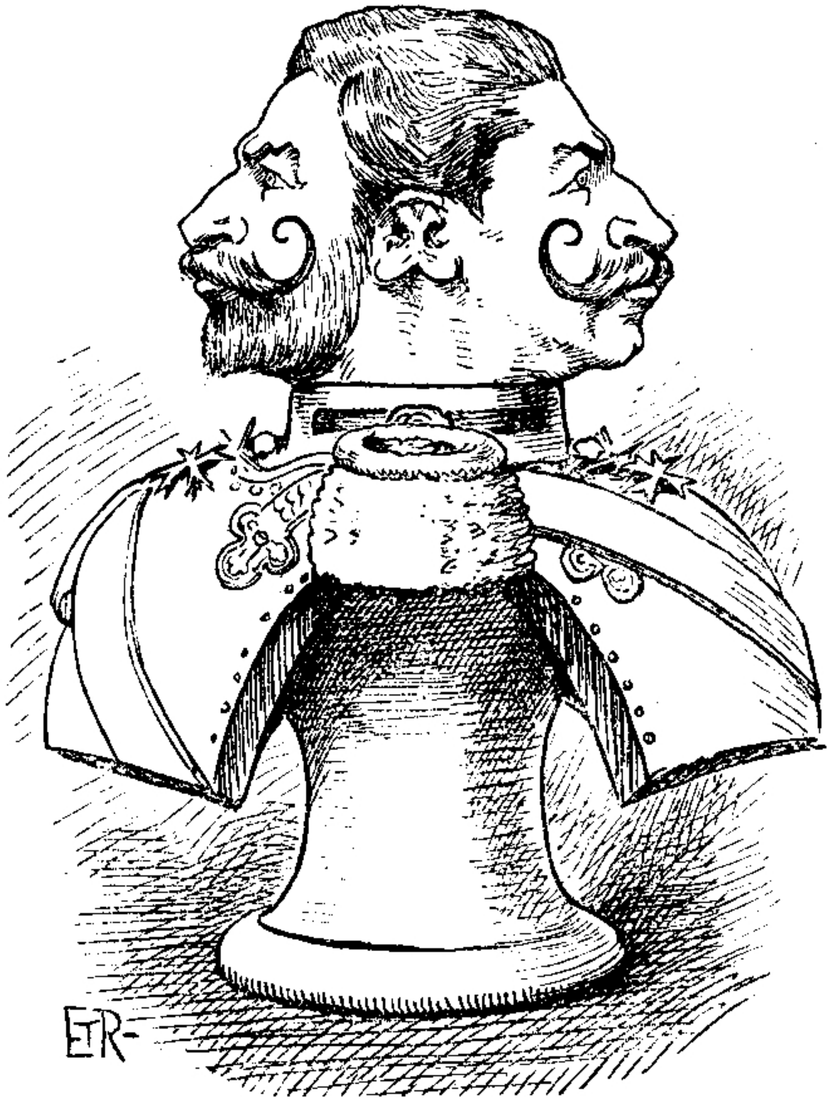
# You too have to go through the same

Suhas Thejaswi Muniyappa


Nobody is gonna read your thesis anyway! Dont bother wasting too much time!
Hmmm...


Your thesis is where you learn academic writing. Nobody is gonna teach you once you pass this stage.
Hmmm .. who should I believe?



The human mind has two aspects, one of which can be a nag and the other a source of great wisdom.

Image source: https://thomascotterill.wordpress.com/2013/06/24/the-inner-nag-vs-inner-wisdom/

# Things which saved me

- Version control
- References
  - Mandeley
  - DBLP, ACM digital library, Mathscinet
- Academic writing
  - Academic communication for MSc Students
- Mathematical writing
  - Handbook of writing for the Mathematical Sciences by Nicholas Higham
  - Mathematical Writing by Knuth, Larrabee and Roberts
  - The Chicago Manual of Style

https://github.com/BenjaminSchiller/ThesisWorkflow/blob/master/ThesisWorkflow.pdf

Such a geek! Why do you write scripts for everything?!
>#! /bin/python


I made some comments on your thesis

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ABSTRACT OF MASTER'S THESIS

| | | | |
|---|---|---|---|
| **Author:** | Suhas Thejaswi Muniyappa | | |
| **Title:** | Scalable Algorithm Designs for the Steiner and Group Steiner Problems | | |
| **Date:** | June 3, 2017 | **Pages:** | 111 |
| **Major:** | Computer Science | **Code:** | T-110 |
| **Supervisor:** | Professor Petteri Kaski | | |

In the Steiner problem, (SP) we are given a connected graph with non-negative integer edge weights and a subset of vertices called terminals. The objective of SP is to find a minimum-weighted subgraph connecting all the terminals. The group Steiner problem (GSP) is a generalisation of the Steiner problem and the input to GSP also consists of a connected graph with non-negative integer edge weights; however, instead of a single set of terminals we are given a collection of possibly intersecting subsets of vertices and each subset is called a group. The objective of GSP is to find a minimum-weighted subgraph which contains at least one vertex from each group. Even though the Steiner and group Steiner problems are $\mathcal{NP}$-complete, they are known accept parameterised algorithms that run in linear time in the size of the host graph and the exponential part can be restricted to the number of terminals.

In this thesis, we discuss two exact algorithms for solving the Steiner problem: a dynamic programming algorithm presented by Dreyfus and Wagner in 1971, and an edge-linear algorithm presented by Erickson, Monma and Veinott in 1987. We also discuss a linear-time reduction for transforming the group Steiner problem to the Steiner problem. As a primary objective of this thesis, we present a parallel implementation of the edge-linear algorithm which can scale up to a billion edges provided that the number of terminals is small. Our parallel implementation of the edge-linear algorithm is at least fifteen times faster than its serial counterpart for graphs up to hundred million edges. Using our implementation, a Steiner tree for a graph with hundred million edges and ten terminals can be found in approximately twenty minutes on a modern compute node. Additionally, we present an implementation of binary and Fibonacci heap data-structures and compare their performance. Contrary to theoretical expectations, binary heap outperform Fibonacci heap for finding the shortest path using Dijkstra's algorithm. Nevertheless, Fibonacci heap can compete with binary heap provided that the underlying graph is dense. Our current implementation of the edge-linear algorithm is available as open source [92].

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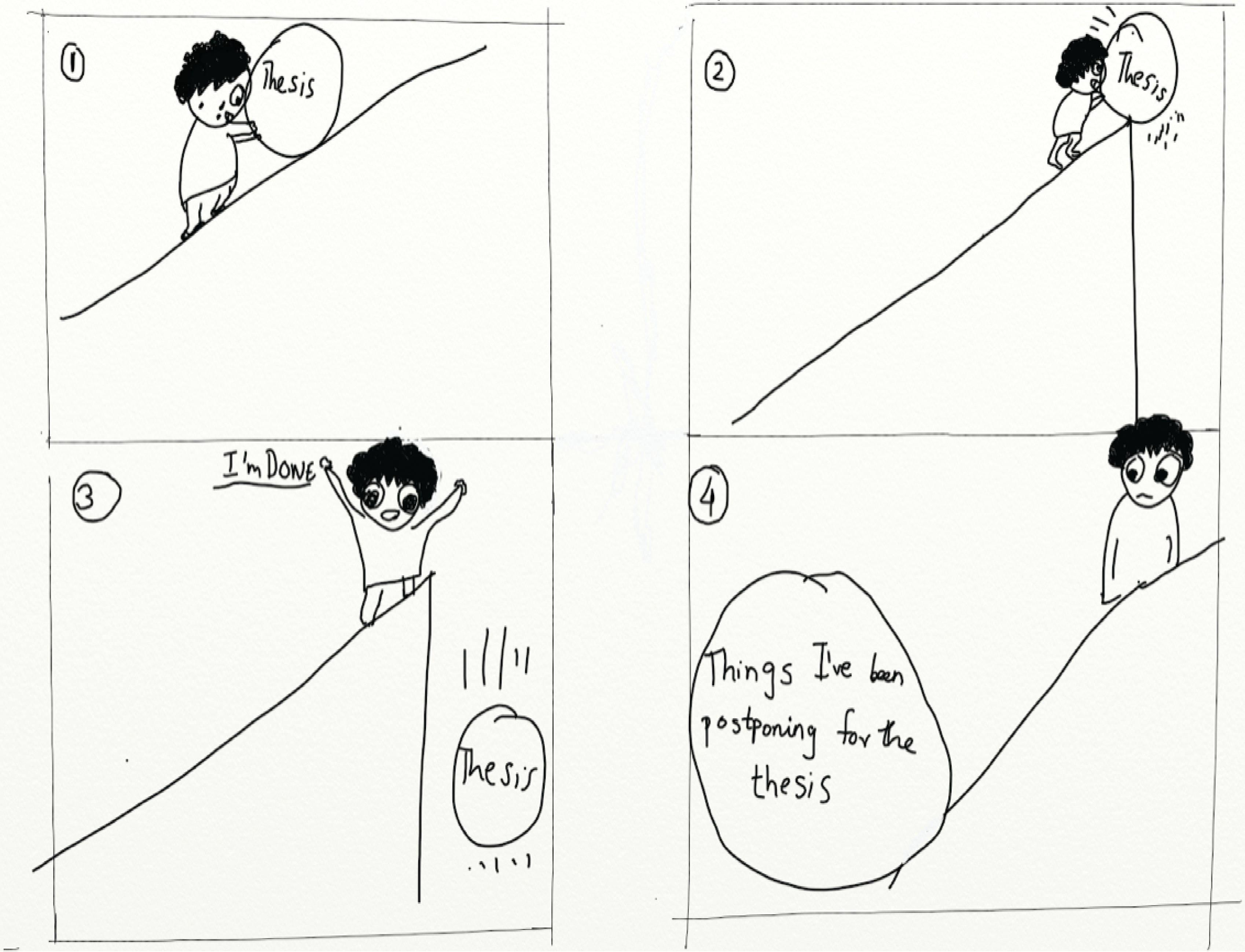
|---|---|
| **Keywords:** | Steiner problem, group Steiner problem, Dreyfus-Wagner algorithm, edge-linear algorithms, parameterised algorithms, algorithm engineering, scalable algorithms |
| **Language:** | English |



①
Thesis
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③
I'm DONE
Thesis
④
Things I've been postponing for the thesis

# I thank the following for their support


- My Supervisor Professor Petteri Kaski
  (Funding thesis and his diligent feedback about my erratic writing)
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- My Brother and Parents
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- My friend Kiran Garimella
  (For helping me with the comics)


I'm done!!