

MY APPLICATION PROCEDURE

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ABSTRACT.

1. GETTING STARTED

1.1. **Should I apply?** *Time period: April - May 2006*

The first natural questions before I could embark on my applications were:

- (1) Do I want to pursue Ph.D. after completing my B.Sc. or do I want to first try for an M.Sc.? Should I think only of continuing at CMI or should I explore other options?
- (2) Do I want to do Ph.D. in Mathematics or should I also consider other options like Applied Mathematics, Computer Science and Operations Research?
- (3) In which countries should I apply? India, United States, France, Germany, the United Kingdom?

While answers to some of these questions were already well-formulated in my mind, I had to do some hard thinking for the other questions:

- (1) Do I want to pursue Ph.D. after completing my B.Sc. or do I want to first try for an M.Sc.?

I was reasonably sure by this time that I would like to continue along the line of research, and that my B.Sc. had provided me an adequate background. Hence, I was confident of being able to pursue a Ph.D. directly.

However, I felt that applying to some universities (particularly those in the U.S.) with only a three-year undergraduate background might be a disadvantage and they may not admit me. So I had in mind the possibility of spending one more year at CMI. There is a scheme wherein a student can complete M.Sc. in a single year at CMI, and I felt that if I do that, my application for Ph.D. will be much stronger.

After some thought, though, I realized that if I continue at CMI for another year as a M.Sc. or Ph.D. student, then there might be expectations within CMI that I will stay there for my later studies, and leaving at that stage might be more difficult. The admissions procedure would be more streamlined to people just completing B.Sc. and hence I decided to apply after my B.Sc.

It took me a long time to reach this final decision, and it was around the middle of May that I decided to take the plunge and apply this year.

- (2) Do I want to do Ph.D. in Mathematics or should I also consider other options like Applied Mathematics, Computer Science and Operations Research?

When I had first joined CMI, (pure) mathematics was my main area of interest. However, after coming and interacting with the computer science faculty, as well as taking optional courses in computer science, I began to get interested in theoretical computer science as well. Moreover, the links between complexity and algorithmic problems and certain areas of algebra made these subjects dearer to me than many parts of mathematics (such as analysis) where my exposure was more limited.

At one point of time, I was considering whether to also apply to departments of Computer Science or Applied Mathematics. However, I decided that my credentials and interest were more towards mathematics. Nonetheless, I decided that one of my criteria for selection of a good university would be a high level of interaction between the faculty in mathematics and computer science, and the presence of faculty in those areas of computer science that I was interested in.

- (3) In which countries should I apply? India, United States, France, Germany, the United Kingdom?

Within India, the only two places that I felt would be well-above CMI in terms of quality were Tata Institute of Fundamental Research (TIFR) and Institute of Mathematical Sciences (IMSc). Thanks to the close collaboration between CMI and IMSc in academic programmes, and due to a summer camp I had attended at IMSc, I had a fair idea about IMSc's Ph.D. programme. I

planned to visit TIFR for its Visiting Students' Research Programme in the summer of 2006, and I hoped to use this visit to learn about TIFR's Ph.D. programme. Both these places seemed attractive. Unfortunately, neither had faculty in the areas I was most keen on (group theory).

The United States was definitely an attractive option – there were a few universities there which had faculty in the areas I wanted to study. More generally, I had got feedback that the top American universities have an environment highly conducive to research. There were three major issues regarding applying to the U.S.: the *financial cost*, the *time/effort required*, and the *four-year rule* in some American universities (which said that a person must have a four-year undergraduate degree to apply to the U.S.). Another factor was *adjustment within the United States*.

The financial cost for application (more details are available later), while quite a huge amount in terms relative to costs of living in India, seemed insignificant relative to what I would get if I got admission on full scholarship (which is the norm for mathematics programmes in leading American universities). In fact, even the *delta* between the estimated expense and the actual expense of one year could cover the entire application costs. Keeping all these factors in mind, I felt that financial considerations should not come in my way if I feel I have a reasonable chance and am keen on going abroad.

The time/effort factor certainly seemed daunting, but again, when viewed from the perspective of *investment*, seemed far less so. The time I would “waste” in applying would probably be far less, I computed, than the time I would “waste” if I got admitted at a place that was ill-suited to me or where I would not get an environment for research.

Regarding the four-year rule, I decided to collect data and try, as far as possible, to apply to U.S. universities that had admitted students completing a 3-year B.Sc. in the past.

Regarding adjustment within the United States, I felt that while this may require some effort, it should not act as a deterrent to applying. I was also aware that universities in the United States are used to coping with international students.

I was not clear, at the time, of whether I should apply to places in Europe, in particular France, Germany and the United Kingdom.

1.2. Gearing for the general GRE. *Time period: May - June 2006*

After I decided, some time in the middle of May, that I would apply this year, I made a tentative list of universities which included TIFR, IMSc, and a few names in the U.S. Since all U.S. universities required scores for the general GRE, subject GRE and TOEFL, I decided to look at the registration procedure for the general GRE. I visited the GRE website:

<http://www.ets.org/gre>

I figured out the following basic facts about the general GRE.

- The general GRE has three components: **Verbal**, which comprises 30 questions and is out of 800, **Quantitative**, which comprises 28 questions and is out of 800, and **Analytical Writing**, which comprises an Essay question and an Argument question, and is out of 6 points.
- The general GRE is a Computer-Based Test (CBT). That is, the questions are asked on a computer. The testing service for GRE in India is Thomson Prometric, and they have centers in major Indian centers, including Delhi, Bangalore, Chennai, Mumbai etc.
- The general GRE is held several times a month at each center, at timings 9 a.m. to 1 p.m. and 1 p.m. to 5 p.m.
- One can register for the general GRE (this include selecting a center, test date, and paying the money by credit card) online. The center and test date cannot be changed after registration. The registration fee is 140 dollars, and if one cancels after registration, 100 dollars are refunded.

I booked my general GRE for 14th September. I did this some time in the end of May.

1.3. The passport hassle. While registering for the general GRE, I discovered that in order to write the examination, I need to carry with me my original passport. No other substitute document can be used. At the time, I did have a passport, which would not expire by the date of the general GRE. However, I had long planned to renew my passport because I had taken it as a minor and it was due to expire in 2008. I also needed to change my residential address.

In the first week of June, I was attending a Microsoft Research Summer School, and on June 14th, I was scheduled to leave for Mumbai to attend the Visiting Students' Research Programme at TIFR. So I gave my application towards the fag end of the Microsoft Research Summer School. On the Monday

after the summer school ended, I was asked to come up to Sanjaynagar police station with my documents and originals. The officer indicated that my passport would reach me within a few days' time.

My passport reached some time in the beginning of July, while I was in TIFR. Thus, I was able to take it along with me when I went to Chennai.

Note: It is not necessary to specify the passport number when registering; however one should make sure one has the passport in hand when going for the actual examination.

1.4. Initial preparation for the general GRE. From what I had heard, the Quantitative section of the general GRE was a cakewalk, and CMI students had consistently got full scores on it.

For the Verbal section, I had heard that there was a GRE-specific vocabulary that I needed to master to do well on the examination. The general opinion was that if one knew the meanings of all the words, it was easy to get a near-perfect score on the verbal component.

Regarding the essay part, I had heard that the essay topics were fairly hard, but getting something like 4-4.5 was not too tough.

While I was going for the Microsoft Research Summer School (which was being conducted at IISc), I visited the Tata Book House at IISc and bought two books by Kaplan, one for the Verbal GRE and the other for the Analytical Writing section of the GRE.

I also downloaded the list of topics for Analytical Writing from the ETS website and started looking at them. Most of the topics seemed very hard and I had very little idea of how to write them. The grading policy which the ETS had outlined was also not too clear to me, and my own evaluation of the pieces I had written ranged from 2 to 4 depending on how I interpreted their guidelines. Thus, I decided to spend some more time in preparing for the essays to ensure that my essays were, in all respects, at least as good as 4.

I had already started doing vocabulary practice for the GRE from the website:

<http://www.number2.com>

I planned to use this website and Kaplan's book to prepare for the Verbal section.

I also downloaded the GRE online practice material (a software called POWERPREP) and had a look at it. This contained two sample tests and problems in the various problem types.

2. DECIDING MY UNIVERSITIES

2.1. Preliminary web-surfing. *Time period: July 2006*

I had the following criteria in mind:

- (1) The mathematics department of the university must either be strong in the overall sense or have faculty in my particular area of interest, or both
- (2) The university should (preferably) have a good computer science department as well, and have strong interactions between the mathematics and computer science department
- (3) The university should, in general, offer full scholarship to students it admits for its Ph.D. programmes in mathematics.
- (4) There should be a reasonable chance of the university giving a fair chance to students from India who have only a three-year bachelors' degree.

I visited the websites of all the universities to determine the application procedure, and also to find out which of them required GRE, TOEFL scores, and also to find out their deadlines. I started compiling information about the deadlines of the universities and the requirements for each. I found the following common features:

- All the universities required general and subject GRE scores as well as TOEFL scores. These scores must be *sent* by the ETS to the universities. Each university has a university code and the scores must be sent to the university according to the university code.
- The universities seemed to ask for information on financial resources
- The deadlines ranged from December 1st (Princeton) to January 15th (Caltech)
- Almost all the application material (including recommendations) was online. The only thing that had to be sent by snail mail was the academic transcript.

2.2. Collecting information over email. *Time period: July - August 2006*

Based on doubts I had regarding the form, I consulted some of my seniors who were passing out of CMI or had already left CMI. They gave me the following information/suggestions:

- (1) For the academic transcript, only the first four semesters need to be specified.

- (2) For financial resources, if one is applying for financial aid, the sections on one's own financial resources are irrelevant. Those sections are meant for people who are offering to pay their fee in full or part.
- (3) For recommendations, it is best that I ask well in advance, so that the recommender has enough time to prepare a thoughtful recommendation.
- (4) In general, when applying to a university, it is good to ensure that there is some chance that the university will admit one.
- (5) It is good to avoid clashing with other students who also intend to apply to the same place, specially if recommendations are being taken from the same person.

2.3. **The final list.** The universities I decided to apply to were:

- (1) **University of Chicago:** This was my favourite because it had all the features: a strong mathematics department on the whole, faculty in my main area of interest (group theory), a few people working in computational group theory (particular Babai), as well as a history of many CMI students having gone there in the past.
- (2) **Princeton University:** The main attractor was the good overall strength of the university. Princeton University did not have faculty in group theory, but on the other hand, it is renowned for its mathematics department as well as its departments in related areas.
- (3) **Massachusetts Institute of Technology:** This had faculty in representation theory, which is close to my primary interests. MIT also has an overall strong department in mathematics, as well as good departments in applied mathematics and computer science. Again, there was a history of CMI students having got admission in MIT.
- (4) **Harvard University:** Although Harvard official policy has a four-year rule, I knew of one person (Samik Basu) who had gone to Harvard after three years at ISI, Bangalore doing B. Math. So I felt that Harvard was worth a try. Although there were no faculty in Harvard working directly in group theory, Mazur and others were working in automorphic function theory and number theory, which were also areas of interest for me.
- (5) **University of Pennsylvania:** This was famous for its Graduate Program and also had a strong faculty group on the inverse Galois problem, which was closely linked with my areas of interest. Further, I knew that Penn would not be hard getting admitted to; there was a precedent of many CMI students having joined Penn in the past.
- (6) **California Institute of Technology:** Professor Ramanan told me that admission in Caltech would not be very hard. Caltech is a smaller place but has good faculty, and I had got good feedback about it from some others who have joined there.
- (7) **University of Wisconsin-Madison:** I selected this University because I had had extensive email correspondence with Professor Martin Isaacs of this university on an unsolved problem I had proposed, and I wanted to work under him. Also, Wisc-Mad's math department was strong on the whole. I decided to apply to Wisc-Mad some time in August, after I had decided on my first six universities.
- (8) **Rutgers University:** I began considering this University when Professor Balaji told me that Rutgers was strong in group theory. I confirmed this by going through the Rutgers webpage. I also knew of CMI students who had been admitted to Rutgers after a three-year B.Sc. programme.

3. BOOKINGS

3.1. **Subject GRE booking.** *Time period: July 2006*

In the end of July, just before leaving for the CMI term, I decided to book my Subject GRE. Based on my tentative investigations, I was sure I would apply to the following places: Chicago, Princeton, MIT, Harvard, Caltech and Penn. All these places had been known to admit students after a three-year B.Sc. programme in the past (either from CMI or from ISI, Bangalore).

For the subject GRE, at the time of booking, one can specify up to four universities to which the subject GRE scores are sent for free. For the remaining universities, the score sending needs to be booked over phone, later, and the booking charges are 15 dollars per university. Moreover, for universities booked later, the scores would take later to reach. So I had to decide what my top four were.

Among the universities I had decided to apply to, I used a combination of my relative preference and the deadline information to come up with the following four names: MIT, Chicago, Princeton, and Harvard. I thus booked my subject GRE for November 4th with these four universities.

3.2. TOEFL iBT booking. *Time period: August 2006*

The TOEFL or Test of English as a Foreign Language, had recently shifted from the old Computer-Based Test format to a new Internet-based Test format. Dates for the new iBT had not been scheduled when I left home for my semester at CMI. Around a week later, I saw that the list of dates was up, and I selected October 8th, on account of its being a Sunday as well as on account of its being sufficiently separated both from my general GRE (September 14th) and my subject GRE (November 4th).

I booked for the TOEFL some time on August 13th. While booking for my TOEFL, I had to again specify four universities to which the scores can be sent for free, and I specified the same four: MIT, Chicago, Princeton, and Harvard.

4. THE EXAMS BEGIN

4.1. Preparation for the general GRE. *Time period: August-September 2006*

In the middle of August, I started getting geared up for the general GRE. The argument topics were not hard and I practised enough of them till I got the hang of doing a good Argument in about 25-35 minutes (the time limit for an Argument is 30 minutes). For the essay, I practised an average of one essay a day for around 2 weeks and also collected general facts related with labels like “education”, “society” and “politics” which I could throw into any essay on the subject. Kaplan’s book was a great help for essay writing. Some time towards the end of August, I felt I had enough of a grip on essay preparation to take it easy.

Preparation for the verbal part involved combining Kaplan’s verbal workbook with practice from Number2. Some of my friends were using Barrons’ wordlist to prepare for the General GRE, and I had a look at that wordlist also. Barrons’ book had more words than Kaplan but it was not as well-organized.

4.2. The general GRE examination. *Time: September 14, 2006*

A week before the general GRE, I checked out the center. The Thomson Prometric center is located in Nungambakkam. My exam was scheduled for 9 a.m., and the security persons told me to come at 8:30 a.m. with my passport and, as a precautionary measure, with a printout of my registration email and a college ID card. He said, however, that neither of these documents would be necessary.

I reached the place at 8:20 a.m. I was made to sign a non-disclosure agreement, which basically said that I was not supposed to reveal anything about the paper to anybody and that the questions were to be used by me only for the purpose of answering. After signing this agreement, I was photographed and my passport was checked. I then began on the general GRE examination.

The essay and argument seemed to proceed well, but I felt that I had fumbled at many places in the verbal section. The quantitative section was smooth: I finished with around 5 minutes to spare, after having double-checked every answer. At the end, I was feeling somewhat disheartened because the Verbal section had not gone as well as I had expected.

After the examination was over, there was an experimental writing question, on which I wrote for fifteen minutes and then quit. I then selected my top four universities (for the general GRE, the selection is after the examination). I was finally asked whether I want this test to be put in my record or whether I want the test scores to be cancelled. I asked for the test to be put in my record and then I was told my scores. I had got a full 800 in the quantitative section and a 690 in the verbal section.

On the way back I was feeling a little disheartened about my performance in the verbal section, and even considered writing the examination again. When I returned, I looked again at the POWERPREP CD for information on how good a given score is. It turned out that a score of 690 in the Verbal section placed me at the 97th percentile among mathematics applicants sitting for the GRE, while a *full* score in the Quantitative section placed me at the 89th percentile among mathematics applicants (percentile, the way ETS uses it, is the percentage of people scoring strictly less marks). This heartened me considerably. After collecting inputs from some more people, I came to the following conclusions:

- The general GRE serves more as a cutoff than as a determinant of one’s ability, especially for people applying to mathematics. Scores of 690 and 800 are good enough with respect to the cutoff
- Good performance in the subject GRE is far more important
- Since (as I believed) I had performed well in the essays also, there was no point in giving the examination again for just one section (the Verbal section).

I received my score report by post around 3 weeks later. It turned out that I had got a full score (6.0) in the Analytical Writing section. My percentile (this is among all applicants) in Verbal and Analytical Writing was 96th, that in Quantitative was 94th.

4.3. The TOEFL iBT: preparation and examination. Earlier on, before the semester had started, I had bought Barrons' book on the TOEFL. The book at the time was not exclusively geared for the iBT; it still called the iBT the "next generation TOEFL". The main thing I practised from the book was Speaking; I did that for around an hour each around 2-3 times in the week just before the examination.

My TOEFL iBT examination was on October 8th, at 1:00 p.m. I left for lunch at 11:15, hoping to be back at 12:00 so that I could come and leave for the examination. When I returned, I found the room locked. It turned out that there was some confusion. Luckily, the confusion was sorted just in time for me to reach the examination center, and I was able to write the TOEFL.

All my sections went smoothly, except one speech topic, where I finished my speech around ten seconds before the allotted time had ended, and so I made a fumbled-up last sentence.

Later, around October 27th, I checked my score online and discovered that I had got 29/30 in each of the four sections: Reading, Writing, Listening and Speaking.

Note: TOEFL also had a confidentiality agreement

4.4. Subject GRE: Preparation and examination. *Time period: September - November 2006*

My subject GRE was scheduled for November 4th. Around July, I had started hunting for books to prepare for the subject GRE. Some of my seniors told me about the book on subject GRE by The Princeton Review. I checked in bookstores for this book but was unable to locate it. I tried to procure the copy that earlier belonged to the seniors but this copy had been taken back home by one of them. So, around the first week of August, I ordered the book from Amazon along with some other books my mother was ordering from Amazon.

Around mid-September, immediately after the general GRE, I "sized" this book, as in I determined the amount of effort needed for the subject GRE. I then picked it up again around two weeks before the subject GRE. I worked in around 2-3 sessions of 4-5 hours, and followed this up with trying a practice test of the subject GRE (two days before the actually subject GRE).

The subject GRE was on November 4th at 9 a.m. I managed to reach the examination center (Stella Maris college) around 8:15 a.m. and everything proceeded smoothly.

Note: Subject GRE also had a confidentiality agreement

4.5. Additional universities for general GRE. *Time: 1st November, 2006*

I decided to book my additional universities for the general GRE. I made an international phone call to the number given by the ETS on the website, and I booked the four extra universities that I had decided to apply to: Caltech, Penn, Rutgers and Wisconsin-Madison.

ETS charged 15 dollars per university, and 6 dollars service charge. In addition, there were phone charges (although the number given by the ETS is toll-free within the U.S., international callers have to pay at the standard international calling rate).

4.6. Score report and additional universities for TOEFL. Although I got to know my TOEFL score online, I did not receive my paper score report for the whole of the month of November. In a follow-up email with the ETS, I was told that the report has been mailed on October 27th. I checked up with some people and they were of the opinion that since all universities anyway require the official scores directly from the ETS, my not having a paper score report should not be a problem.

I finally got my TOEFL score report in January.

For TOEFL, I booked my additional universities online (unfortunately, the option is not available for the general and subject GRE). The charge was 17 dollars per university.

4.7. Score report and additional universities for subject GRE. I had found out from some seniors that the paper score report for the subject GRE typically reaches some time towards the fag end of December. I felt that waiting for the score report to reach me before booking my additional universities would be cutting it too thin. So, on December 8th, I called the phone number for the GRE (the same one I had used for the general GRE) to find my score and book additional universities.

Finding my score cost 10 dollars and booking the additional universities cost 66 dollars (15 dollars per university and 6 dollars extra).

Later, I realized that when I book for a university to receive my scores, I can request for *both* the general and subject test scores to be sent to the university (with the total cost still being 15 dollars). Hence, if I had waited for the subject GRE scores and then booked my additional universities together, I would have saved 66 dollars. However, that would also have meant delaying the reaching of the General GRE scores to the extra universities. I think this point should have been clearer to me earlier so that I could have taken a more informed decision (I may still have chosen the way I did).

I finally got my paper score report around December 21st. My raw score was 62/66 (63 correct and 3 wrong out of 66). My scaled score was 880/990 and my percentile was 97th.

5. RECOMMENDATIONS

5.1. Number of recommendations. All the universities I was applying to accepted online recommendations (two of them, Chicago and Rutgers, started accepting online recommendations only this year). For all of them, a minimum of three recommendations was needed. There were some universities that allowed me to get more than three recommendations. However, I did not use more than three recommenders for any of the three universities – probably because following up for three recommenders itself was enough work! This is something I could probably have done differently.

5.2. Whom should I take recommendations from? I was reasonably sure that none of the professors I would approach for recommendations would write negatively about me; however, I wondered whether they would have had enough interaction with me to write something that would bring out my strengths and initiatives properly. After some thought, I selected on three people who had taught me and interacted with me throughout my two years at CMI: Professor Ramanan, Dr. Amritanshu Prasad, and Professor Balaji.

5.3. Professor Ramanan. I had attended two courses under Professor Ramanan and had also had many personal sessions with him where I had learnt topics of algebraic geometry, differential geometry and complex analysis. In addition, I had shared and discussed some of my original work with him.

Professor Ramanan is a well-known person and is also knowledgeable about a number of universities, so I sought both his advice on where to apply and his recommendations to the places I decided on.

During the holidays itself, I asked Professor Ramanan for advice on which places to apply to. Later, in August, I had a long discussion with him on the factors to consider while applying. This helped me decide how to go about selecting my universities and projecting myself to those universities.

After this discussion, I requested Professor Ramanan for recommendations to the universities I was applying to. He agreed to write recommendations for me. Till the end of September, I had decided on seven universities (all excluding Rutgers) and I had registered him for all of them.

5.4. Dr. Amritanshu Prasad. I had interacted with Dr. Amritanshu Prasad over the past two years. He taught a few classes in the Algebra II course, then taught the Analysis I course. I also attended a summer camp where he gave some lectures. I had had many fruitful personal sessions with Dr. Prasad, and I felt I should take a recommendation from him.

I approached Dr. Prasad sometime in September, and he agreed. I filled his name for all the universities I was applying to.

5.5. Professor Balaji. Unfortunately, Professor Balaji had a hectic travel schedule in August and September and I got around to meeting him only in the middle of October. I told him that my main area of interest was group theory and algebra. He suggested Rutgers as a good place for pursuing group theory, and also gave the names of faculty members at some other areas who were doing cutting-edge work in group theory. Based on his suggestion, I did some research on Rutgers and appended it to the list of universities I was applying to. This gave the grand total of eight.

I also had a look at the websites of some of the other universities that Professor Balaji had suggested, but felt that they are not worth applying to.

5.6. Following up for recommendations. There was a slight glitch in the MIT recommendation process. MIT had an evaluation request form, and the rule was that I could submit the evaluation request form only once. I first filled in Professor Ramanan's name and submitted the form (at the time, I had not confirmed with the other recommenders).

After realizing my folly, I scrapped that online application form and started another one. Since Professor Ramanan had not send his recommendation, I requested him to use the *new* application form and ignore the earlier request.

Professor Ramanan and Dr. Amritanshu Prasad did all the universities some time in the third week of November, with the following exceptions:

- They could not do Rutgers, because they had not received any online request for Rutgers
- Professor Ramanan was unable to locate the request email from Wisc-Mad

I promptly resent the request email from Wisc-Mad, and then I sent an email to Rutgers' admissions office asking them why request forms had not reached the professors.

It turned out that that week was Thanksgiving, so Rutgers responded about a week later, saying that the recommendation requests would be sent *after* I submitted the online application form. This created an added complication.

The Princeton deadline was approaching (it was November 24th and the deadline was December 1st). Professor Balaji had planned to do my recommendations the previous weekend, but had been unable to complete his drafts. He was also in a hurry as he had to go out of station. So he finished off Princeton and said he would do the remaining as and when he got free time.

Over the next three weeks, he gradually completed the remaining universities, and by December 23rd, he had done all the universities.

Professor Ramanan did Wisc-Mad and Rutgers some time in the second week of December.

6. STATEMENT OF PURPOSE AND RESUME

6.1. The resume. At one point in time, I was considering working at Microsoft Research over the winter, and I prepared a resume for this purpose. Though the plans didn't work out, the plus point was that I had a resume to start with. I spruced this up for my university applications and used it for Princeton. With some minor modifications, I used the resume for all the other universities as well.

6.2. Statement of purpose. Preparing my statement of purpose was probably the most daunting and intellectually draining of all tasks. While preparing my statement of purpose, I wanted to keep all the following things in mind:

- (1) It should bring out my talent, initiative and interest
- (2) It should bring out my areas of interest
- (3) It should bring out why I am choosing to apply to the particular university
- (4) It should have good language, good sentence structure, and good overall organization.

6.3. Some preliminary write-ups. In the period between June and October 2006, I started working on preparing stuff related to my competencies, my areas of interest, and my past activities. Some of these are put up at:

- Competencies are at the competencies part of my homepage:
<http://www.cmi.ac.in/~vipul/competencies>
- Areas of interest (group theory, differential geometry, algebraic geometry, number theory) are at:
<http://www.cmi.ac.in/~vipul/areasofinterest>
- Activities and achievements which area t:
<http://www.cmi.ac.in/~vipul/activities>

6.4. The first draft. The weekend after my subject GRE, I started on the first draft of my Statement of Purpose. I had been putting this off for quite a long time, hoping to collect enough things to write about before I began. But I finally realized that instead of keeping on trying to collect points, it may make more sense to work on a draft.

The first draft had a lot of good content but sounded pretty mechanical (lore like a shopping list). I made a few generic iterations (that is, iterations that were not university-specific) until I realized that the Princeton deadline was approaching, and I had better start gearing towards that.

In my general draft, I tried to do the following:

- I started off by stating where I am applying to, and what my areas of interest are.
- I then proceeded to describe a bit of my Olympiad background and why I came to choose mathematics as a career option (thus bringing out both my achievements and my initiative/desire to pursue mathematics)
- I then discussed what I had learn in the various areas of mathematics, giving special emphasis to summer camps, extra courses I had credited, and other ways that I had demonstrated initiative.
- I then proceeded to describe areas where I had done some original thinking, research and exploration.
- At the fag end, I mentioned my interest in teaching and sharing mathematics.
- The final paragraph was intended to be a university-specific one, a paragraph where I would describe why I wanted to be selected to that particular university.

6.5. Working on the piece for Princeton. During my earlier exploration of the universities, I had picked on Princeton as a place to apply to largely because of the overall reputation of its mathematics department. This was despite the fact that Princeton didn't seem to have too many faculty in my areas of interest. However, as I started trying to jot my last paragraph, I realized I was pretty much in a fix about what to write about Princeton.

I went through the webpage again, and made a last paragraph that again looked like a shopping list of people and things there. Then I realized that this is not the kind of final paragraph I should make. After some serious thinking, and consulting with others, I made a paragraph that reflected why I would like to join the Princeton mathematics department.

Princeton also had a serious words constraint: an upper limit of 1000 words. Since I had a lot to write in the beginning, working under this word constraint was quite restrictive, and I had to end up chopping a lot of words and using many awkward constructs (to be miserly on words).

I finally had a reasonably final SOP by around 23rd of November.

6.6. The next batch of 3. After Princeton, I took a break of a few days, and then began work on the next batch of universities. These included Rutgers, Harvard and Pennsylvania. They had the following constraints:

- Rutgers had no constraints, except the fact that it had to be given in a text area
- Harvard had a 1000-word limit (just like Princeton)
- Pennsylvania had a 1000-word limit, and a 6000-character limit

I first started work on the Rutgers SOP because I wanted to write freely without a word constraint. While working on the Rutgers SOP, with Princeton's SOP as a starting point, I discovered that I had made a few minor factual errors in the Princeton SOP (discernible only to the trained mathematical eye). This was a slight shock to me (I had gone through the SOP many times for language and style but had forgotten to check the math of it). So this time I did a far more careful check.

Writing the Rutgers SOP felt better than writing the Princeton SOP, primarily because there was more elbow room. Also, there were more people at Rutgers who seemed potentially interesting for me, and I was able to sprinkle mentions of all of them.

In parallel, I started working on the SOPs for Harvard and for Pennsylvania. These again proved somewhat challenging, but now that I had done the groundwork, the incremental work for each SOP was less.

I had finished all these by December 12th or so.

6.7. The next batch of 3. Of the four universities now remaining, Caltech had a deadline as late as January 15th, so I decided to defer work on the Caltech application for later.

I thus had the following places to work on:

- Chicago, which was at the time my top choice, and where the word limit was 2500 words, which gave me ample space. I also had a lot of things to say for Chicago. The material had to be entered in a text area
- Wisconsin-Madison, where the SOP was expected to be two and a half pages long (when viewed in their PDF preview). This was not as long as I would have liked, but it was still more than a thousand words. Again, the material had to be entered in a text area
- MIT, where there was no explicit limit for the SOP, and where the SOP had to be written in a text area.

I spent the maximum time on my Chicago SOP, for two reasons: the word count for Chicago was the highest, giving me maximum elbow room, and I had the most to write for Chicago (considering it seemed my top choice at the time).

In parallel I was working on the SOP for Wisconsin. I was very pleased with the way the Wisconsin SOP turned out, particularly considering that it was only two and a half pages.

I also finished the MIT SOP.

6.8. The last one. By December 20th, I had closed my applications to all the other universities, and Caltech was the only place left. By this time, I was pretty much fatigued with university applications.

Caltech didn't have any word limit, but their instructions urged for a *short* piece, and I wasn't in the mood to write anything much. So I kept it roughly at the same length as the Wisconsin piece, with a few minor edits here and there.

7. MAKING THE FINAL SUBMISSIONS

7.1. Getting sealed copies of the transcript. Around the middle of November, five of us (who were applying abroad) requested the office for sealed copies of our CMI internal transcripts for the first four semesters. As far as I expected, we were supposed to send one transcript to each university. Since I was interested in applying to eight universities at the time, I took eight sealed copies of the transcript. It later turned out that this was a mistake.

7.2. Princeton submission. The Princeton deadline was 1st December. I had to send the following things to Princeton:

- The online application included Statement of Purpose, 3 letters of recommendations, resume, and various form details
- The postal application had to include a sealed copy of my transcript. I decided to also send photocopies of the various other certificates (for Olympiads and other achievements) – not that it mattered, but just as proof of the various things I had said in my resume.

I also included photocopies of my GRE and TOEFL scores; these photocopies could not serve as substitutes for the official scores from ETS but at least they could serve a temporary purpose in case the official scores were delayed in coming.

To prepare the postal application, I did the following:

- I went through all the instructions on the website and figured out that Princeton did not want anything other than the transcript.
- I found out the rates and schemes for international courier. It turned out that DHL charged Rs. 983 for students applying abroad (this is called University Express scheme). I found out the 24-hour center in Chennai (it is located in Guindy).
- I confirmed a few things with the Princeton Graduate Admissions department before sending (namely, whether I can send photocopies of other certificates, and whether I need to attach any covering letter with identifying information). They replied positively about sending other certificates and said I don't need to put any identifying information apart from my name and the department to which I am applying (to be very safe, I also added my date of birth)
- On the morning of Friday, 24th November, I sent off my packet to the Princeton address via DHL from the center at Guindy. The packet comprised a sealed copy of the transcript, copies of my general GRE and TOEFL scores, and photocopies of some of my certificates on Olympiads.

After that, I had a look at my online application again. Some final things with my online application:

- I confirmed all the details I had put in, and my parents cross-checked the biographical information and information i had entered about them. I also deliberately left the financial resources section blank (rather, filled in zeroes everywhere).
- I was in a bit of a quandary on whether to wait for all the recommendations to be received before i submitted the online application. I was really keen to submit the online application by the afternoon of Friday, but one recommendation had still not come through. Luckily, the recommender, Professor Balaji, finished the recommendation some time on Friday afternoon. I was able to submit the recommendation and thus my first university application was completed.

After I had submitted:

- As soon as I submitted my online application, I received an automated confirmation for Princeton. This said that a personally written confirmation about my online application having been received would be sent soon.
- On Monday, I got a letter saying that my online application was securely received, and that I could check my further status on the Status Tracking page.
- Princeton had a Status Tracking page, and the DHL also allowed Status tracking. Through Status Tracking, I found out that the Princeton application reached on 27th morning, however, the packet reaching was not immediately updated by Princeton. Princeton did the update a couple of days later. It not only showed my transcript as having been received, it also put in separate entries to indicate the additional certificate photocopies that had been received.
- The Status Tracking page on Princeton also showed, in a little time, that my GRE General score had been received. A day or so later, I saw that my TOEFL score had also been received. It didn't show my subject GRE score as being received – but at that time, I myself hadn't received my subject GRE score.

Thus, by 1st December (the official deadline) Princeton had received my online application, my letters of recommendation, my transcript, my general GRE score, and my TOEFL score. It had *not* received my subject GRE score – the only thing missing for a complete application.

7.3. Rutgers. When I came to the Rutgers application and went through the details again, I came across two pieces of news:

- The application was due to be submitted on 1st January, as opposed to 15th December (which was what I had initially noted).
- The Rutgers department required *two* transcripts, as opposed to just one.

Since I had just as many transcripts as universities, and since I was now at home (Bengaluru) rather than in my institute, I was a bit of a quandary about what to do. I considered two options:

- I could postpone sending the Caltech application to once I was back in Chennai. This was feasible since the Caltech deadline was January 15th.
- I could request CMI to send some more sealed transcripts to me.

At the time, I decided to exercise the first option, or at least keep to the first option unless I came across yet another university that required two copies of the transcript.

I was keen to submit the online application for Rutgers as soon as possible because the recommendations could be sent for Rutgers only *after* I had sent the online application. I submitted the online application at around 6th December.

As soon as I submitted the application, one of my recommenders, Dr. Amritanshu Prasad, submitted his recommendation for Rutgers. Professors Balaji and Ramanan submitted their recommendations over the coming two weeks. Thus, by the time the final Rutgers deadline was reached (January 1st) all the recommendations had been sent.

I sent my Rutgers transcripts around December 20th, along with the applications for other universities (MIT, Wisconsin, Chicago). More on this is discussed in the later section on those universities.

7.4. Pennsylvania. Some time in the end of November, my University of Pennsylvania application was shifted from the old system (ExpressApp) to the new system (ApplyYourself). By that time, two of my three recommenders had already submitted their recommendations on the old system.

I was in a fix as to whether to ask them to resubmit recommendations on the new system, or whether to ask the Penn admin people to shift the recommendations. Finally, I decided to write to the Penn admin people asking them whether they could shift the recommendations automatically. They asked me to mark those who had already submitted recommendations as “offline” providers and that the Penn admin people would attach a printout of the recommendations to my application.

I finally submitted my Pennsylvania postal application on December 8th, and on December 12th, I submitted my online application. After I submitted my online application, I received an email from them. The email had two bombshells:

- The address which the email gave for sending supplementary materials was the *departmental* address but the address which had been given on the website was the general Graduate Admission Office address.
- The email asked for *two* copies of the undergraduate transcript.

I at once sent an email to the administrative person at Pennsylvania explaining both the problems to her. She did not reply immediately. The deadline was mounting and I was wondering whether I should send another set to the correct address and with the two transcripts. I wrote another email, this time to the mathematics coordinator for admissions, and she replied immediately saying that neither matter was a problem because:

- The mathematics department worked in coordination with the Graduate Admissions Office for admissions and material sent to either place would be accessible to the other
- They would make an extra copy of the transcript themselves

This was a relief to me. Nonetheless, I decided that:

- I would henceforth send the postal thing only *after* submitting the online application
- I would ask CMI for some extra sealed copies of my transcript

7.5. Harvard. Harvard was by and large smooth, though the application had a few tricky components, including the one on finances (where I had to do a careful totalling from their estimated living expenses on various fronts).

The day on which I decided to submit my Harvard application, I found that the application system was misbehaving. In particular, my recommendations seemed to not be there, and more alarmingly, the mathematics department seemed to have disappeared from the list of departments to apply to. I sent an email to Harvard, and got an automated response saying that they got hundred of emails per day and I should expect a reply in a week's time.

I instead located the mathematics department person responsible for admission and emailed her about the problem. In parallel, my father called up the address at Harvard (once it was working hours for them) asking them about the problem. The person replied saying that he had already received hundreds of calls on the matter, but that the administrative people were in California and their office hours hadn't yet begun¹.

Also, in some time the mathematics department person replied saying that the problem had been fixed, and that the problem had been from the administrative end.

After this, I managed to submit my Harvard application.

7.6. Wisconsin-Madison, MIT, Chicago. All these applications proceeded smoothly. I submitted the online applications, confirmed that there were no "double transcript" requirements nor was there a different address suggested. I then sent the transcripts to each university.

The problem though was with their receiving the postal applications. In all cases, the courier company indicated that my transcript had been received. However:

- All the universities were on holiday in the Christmas week. Wisconsin updated a couple of days after it returned from holiday, so around January 2nd, I came to see that it had received my transcript.
- Chicago and Rutgers updated some time around January 11th (they were both catching up with the huge backlog of applications).
- On January 11th, I wrote to MIT asking them whether they have received my transcript. The Graduate Admissions Office replied saying that nobody from the department had received my transcript. I wrote to them giving the name of the person who had picked the courier, but they said that it was not anybody from the department. So I sent my transcript to MIT yet again (I did this on January 15th, again via DHL).

7.7. Caltech. Caltech had the option of sending the transcript electronically. I scanned my original transcript and sent the scanned transcript over to Caltech. However, since I was not sure about whether there would be any problems with the scanned transcript, I anyway sent the full packet by courier.

Caltech indicated in its online tracking that it had received my transcript electronically (unfortunately that was *after* I had already sent the postal version).

8. SUMMARY

8.1. Expenses. The procedure for applying abroad has costs of varying natures. Here is a summary of the various cost headers:

- (1) Examinations: the general GRE, subject GRE and TOEFL cost 140, 140 and 150 dollars respectively (totalling to 430 dollars – the rates increase every year).

Further, for the TOEFL, there is a 17 dollar additional change for every extra university booked after the first four, and for the general/subject GRE, there is a 15 dollar charge plus a service fee of 6 dollars (plus phone charges).

If one uses a single phone call for the general and subject GRE, and one applies to eight universities, this comes to a total of roughly \$ 570. For me, the total came to this plus another \$ 66 because I made the phone call for additional universities twice – once for the general GRE and once for the subject GRE.

Of course, if one chooses to cancel or reschedule an examination (due to unavailability of passport or some other reason) the cost goes up by the cancellation charges for that examination.

- (2) University application costs: The university application costs range from \$ 45 to \$ 90 (the lowest was Wisconsin-Madison and the highest was Harvard). Most are in the range of \$ 50 to \$ 70. The application fee has to be paid at the end of online submission – so you can start filling out a form, get recommendations and then decide not to apply at the last minute. For me, the total across eight universities was around \$ 460.

¹U.S. has different time zones, with Harvard in the east zone and California in the West zone

- (3) Cost of sending the postal materials: DHL university express costs Rs. 975 per application, so the total for eight applications is Rs. 8000 (if you also throw in charges for commuting to the DHL center etc.) If you use registered Government post, the charges are somewhat less (something like Rs. 700 per application). DHL offers better online tracking facilities and is a bit faster.
- (4) Cost of preparatory materials for the GRE/TOEFL: Good preparatory books for the general GRE typically come in the range of Rs. 400, good preparatory books for the TOEFL are also in a similar range. In my case, I bought one book on the verbal component and one on the essay component, as well as one book on TOEFL.

Procuring the subject GRE preparatory book is a more tricky task. This book has very few copies available in India, so if you see a copy, *buy it at once*. I had to order the book from Amazon, which levies an additional charge of 5 dollars for the book (the base cost being \$ 9.50).

The total cost of books, even at its worst, is unlikely to be more than the equivalent of \$ 40.

The total application costs (if applying to eight universities) thus come to somewhere in the range of \$ 1100 (this is an upper limit).

8.2. Timelines. Applying to universities in the United States requires a lot of time, patience and effort spread over a long duration, and in that sense, it is painful and taxing. Roughly, these are what I would call ideal timelines (of course, many of these things might change with the new pattern being introduced for general GRE):

- As early as possible: Try to procure a copy of the book for subject GRE
- April – May: decide to apply; arrange for the passport if you don't have one
- May: Make a tentative list of possible places and areas to apply for, start shooting off emails with specific queries and talking both to students in the universities you want to go to and professors in your own place for advice
- May: have a look at the general GRE syllabus and assess your preparedness and the amount of time you need to be well-prepared. Book the GRE for some time in August-September.
- June: Finalize a list of the top four among the universities you want to apply to.
- July: Register for the subject GRE in November as soon as registration opens up. Also register for the TOEFL after assessing preparedness (hopefully for some time in September)
- June-July: Keep working on general GRE preparation (specially verbal, also a bit of essays)
- July-August: Start working on asking people if they are interested in giving recommendations in principles, also ask their help in getting a list of universities ; start filling out application forms and clarify doubts from seniors as soon as possible
- August: Gear for and give the general GRE
- September: Start working on speech for TOEFL and give the TOEFL examination
- September: Fill in the names of recommenders in the online application forms and request them for specific recommendations
- October: Work for the subject GRE. This is probably the most important of the examinations, so don't underestimate its value.
- October: Register for extra universities in TOEFL
- October: Start working on the Statement of Purpose and Resume; collect all necessary inputs for it
- October: Finalize (and close) the list of universities to which you are applying
- October: Get sealed transcripts (you may want to do this earlier if it takes time)
- November: Give the subject GRE
- November: Complete work on the Statement of Purpose and Resume; follow up and have the letters of recommendation completed
- Submit the online applications for universities with early deadlines, then send the applications by post
- December: Find your subject GRE score (by phone, costs \$10) so that you can fill it in in application forms; book extra universities. If you want to optimize the phone call, you should make sure that all the early deadline universities were booked among the top four, so that you can defer this additional call to combine the General and Subject GRE.
- December: Submit applications for the remaining universities.

As for sending postal applications, there is a trade-off. If you want to attach a photocopy of the subject GRE score sheet to your application, wait till December 20th or so. However, if you delay this long, your application may get lost or misplaced in the Christmas week. So in that case, be prepared to have to send an application again.