

An Interview with James Maynard: 2014 SASTRA Ramanujan Prize winner

by Gonit Sora - Friday, November 21, 2014

<https://gonitsora.com/interview-james-maynard/>

James Maynard (Photo by Eleanor Grant)

The prestigious **2014 SASTRA Ramanujan Prize** was awarded to **Dr. James Maynard**, a 27 year old mathematician from Oxford University who specializes in number theory. The prize, established in 2005, is awarded annually to young mathematicians for outstanding contributions in the areas influenced by the mathematical genius [Srinivasa Ramanujan](#). The age limit for the prize has been fixed at 32 to reflect Ramanujan's achievements in his brief life span of 32 years. Previous winners include [Terence Tao](#), [Manjul Bhargava](#), Kathrin Bringmann, and many other famous names. The prize will be awarded on 22 December, 2014 at SASTRA University to commemorate Ramanujan's birth anniversary in a special function.

The prize recognizes his recent paper on small gaps between primes to appear in the Annals of Mathematics in which he establishes the sensational result that the gap between two consecutive primes is no more than 600 infinitely often. His latest achievement is his announcement of the solution to the \$10,000 problem of [Paul Erdos](#) concerning large gaps between primes (also announced independently and simultaneously by Kevin Ford, Ben Green, Sergei Konyagin and [Terence Tao](#)).

Dr. James Maynard obtained his BA and master's degrees in mathematics from Cambridge University. He then moved to Oxford where he complete a DPhil under the supervision of Professor Heath-Brown. He joined Magdalen as a Fellow by Examination in 2013. In the academic year 2013-2014 he is on leave of absence from Magdalen as a CRM-ISM postdoctoral fellow at the Université de Montréal. His research interests are in classical number theory, in particular the distribution of prime numbers. His research focuses on using tools from analytic number theory, particularly sieve methods, to study the primes.

Gonit Sora was fortunate to take an interview of Dr. Maynard, which we reproduce below. The questions were contributed by *Bishal Deb* and *Manjil P. Saikia*.

Gonit Sora (GS): Congratulations sir on your winning the SASTRA Ramanujan Prize. How do you feel about it?

James Maynard (JM): It is wonderful to receive such a prestigious prize! It will be my first such prize, and it is a great motivation to continue working in number theory. It is very humbling seeing the amazing list of previous winners of the prize.

GS: Will this be your first visit to India?

JM: I went to India on a family holiday 3 years ago, so this will be my second visit – I'm looking forward to coming back! Last time my visit was to the north (mainly around Rajasthan) so it will be

interesting to see some of southern India.

GS: Do you have contacts with any Indian Mathematician?

JM: I haven't had any direct collaboration with an Indian mathematician. The 2005 winners of the Ramanujan prize (Professors [Bhargava](#) and Soundarajan) both have an Indian background and have done absolutely fantastic work in closely related areas – I always make sure to read anything they produce at it is always illuminating.

GS: How did you get interested in mathematics?

JM: I've always liked mathematics since I first went to school. It is difficult to describe precisely what it is that really got me interested. Certainly the exactness of the subject, the subtleties and the beauty of some of the ideas involved all played their part.

GS: Is there someone you would want to mention, someone who inspires you or someone who has had a great impact on you?

JM: I feel like I've been helped enormously by the encouragement and mentor-ship of my various teachers from high school through to my PhD supervisor, and I owe a huge amount of thanks to all of them. In terms of inspiration it is mainly the historical mathematical greats – Gauss, [Riemann](#) and such who inspire me. [Ramanujan](#), of course, certainly fits into this category.

GS: Can you describe a typical working day of yours?

JM: I tend to take a fairly relaxed approach to work. I'm a naturally late person, so I'll normally wake up quite late, and then try to do administration and read some mathematics in the morning. I'll have lunch with colleagues, and then in the afternoon I'll work on my research. This typically involves going through some mathematics paper in detail, and trying to work out if the key ideas can be applied to a problem that I'm working on. My desk is normally a complete mess, covered in odd bits of paper where I've tried out failed ideas.

GS: Can you tell something about your recent discoveries to the general reader?

JM: If someone pays for something online, all the information is encrypted to prevent a criminal obtaining their credit card details. This encryption uses prime numbers, and if the primes had a very different distribution to what we believe, then the information could be very insecure and a hacker could obtain the credit card details. My work can be seen as a first step in ruling out the possibility of such strange distributions, although mathematicians typically like to study these problems for their intrinsic interest and beauty.

GS: What are your current research interest? Can you describe some of the problems that you are working on at present?

JM: I'm working mainly on the distribution of prime numbers – this is still my main research interest. There's a huge number of questions I'm interested in, but in particular I'm trying to see if there are some

more problems which can be tackled using the techniques developed in the study of small gaps between primes, as well as trying to branch out into other questions on the distribution of primes.

GS: What do you think of the twin prime conjecture? Do you think the liminf will go to 2? What motivated you to work on such a classical problem in number theory like the the Twin Prime Conjecture?

JM: I'm confident that eventually mathematicians will be able to prove the conjecture, but I think we really need some fundamentally new ideas to prove it. There are some barriers which mean that the current method can't do better than showing there are infinitely many pairs of primes which differ by at most 6.

One of the appealing parts of prime number theory is the fact such that easily stated problems can be so difficult – the twin prime conjecture is a great example. At first I was just trying to learn about the subject, and one of the best ways to learn is to try to improve the current techniques slightly. When I tried to do this, I realized that maybe there was a way to improve the approach of Goldston, Pintz and Yildirim, who had the strongest previous results.

GS: Is it always a good idea for a young mathematician to start with a major open problem?

JM: Certainly not! I think it is a good idea for a young mathematician to have an appreciation of what the 'big problems' in the area are, how current work that mathematicians are doing fits in with this, and what the technical obstacles to these problems are. However, I think most of mathematics progresses in increments, and it is very unlikely for any mathematician to suddenly produce a proof of a famous problem from thin air. My work definitely was a result of me studying work of many other mathematicians and thinking about active topics, rather than deciding I'd try to prove the twin prime conjecture.

GS: It has been seen that very surprisingly some results similar to yours have also been found by other mathematicians. Are their methods totally different from yours? What would you like to say about it?

JM: The original result on bounded gaps between primes due to Zhang, and recent work on large gaps between primes by Ford, Green, Konyagin and Tao both used really quite different techniques to me. It is certainly slightly surprising that these results have come out so close to one another, but it is fascinating how different techniques can be applied to answer the same question. The same method on small gaps between primes was independently discovered by Tao at the same time – I think this is just a pure coincidence.

GS: Are you a contributor to the polymath project? Please say something about the polymath project.

JM: I took part in the 'Polymath 8b' project on bounded gaps between primes, which was a very interesting (and fun) experience. It was very unusual for me to work in such a large group and so publicly – one really needed to lose inhibitions and be willing to post ideas that we're fully formed (and potentially wrong!) online for everyone to see. There was almost daily incremental progress, which was also very different to my typical research projects. It was great fun to be part of such a nice enthusiastic group, which was led particularly well by Tao via his blog.

GS: It is sometimes not possible for students in developing countries like India to get access to quality information, how does one circumnavigate this obstacle if one is interested in math?

JM: This is difficult, and I'm not particularly well placed to solve this problem. Fortunately the Internet has been a huge aid in this regard – there are now a large number of available mathematics resources online. There is currently a move for research to be more freely accessible on the Internet – most new papers are first posted to arxiv.org, for example, which I read daily and is freely available.

GS: Apart from mathematics what hobbies do you have?

JM: Outside of mathematics I'm an Arsenal FC soccer fan, I like listening to alternative music and I enjoy debating with friends (about absolutely anything!) I'm also a bit of an addict for gadgets/computers and good food and drink.

GS: Do you have any message to give to our website?

JM: Thank you for the interview, I'm glad that there is such interest in prime numbers at the moment!

Gonit Sora wishes Dr. Maynard all the success in his future endeavours.

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