



Yitang Zhang's Santa Barbara Beach Walk

Grand ideas have a way of turning up in unusual settings, far from an office or a chalkboard. Months ago, Quanta Magazine set out to photograph some of the world's most accomplished scientists and mathematicians in their favorite places to think, tinker and create. This series explores the role of cherished spaces — public or private, spare or crowded, inside or out — in clearing a path to inspiration.

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[Ryan Schude](#) for Quanta Magazine

Yitang Zhang on the beach adjoining the University of California, Santa Barbara, after scratching a function in the sand related to his current work on the Landau-Siegel zeros problem.

As an adolescent during the Cultural Revolution in China, Yitang Zhang wasn't allowed to attend high school. Later, in his 30s, he worked odd jobs in the United States and sometimes slept in his car. But Zhang always believed he would solve a great math problem someday. Still, despite

becoming one of China's top math students and completing his doctorate at Purdue University in Indiana, for seven years Zhang could not find work as a mathematician. At one point, he worked at a friend's Subway sandwich restaurant to pay the bills.

"I was not lucky," Zhang, who is both incredibly reserved and self-confident, [told Quanta in a 2015 interview](#).

At 44, after finally being hired to teach math at the University of New Hampshire, he turned his attention to [number theory](#), a subject he had loved since childhood. He analyzed problems in his head during long walks near his home and the university. In his 50s, well past what many mathematicians consider their prime years (indeed, the [Fields Medal](#) is awarded to [mathematicians under the age of 40](#)), he began trying to prove the twin primes conjecture, which predicts an infinite number of prime number pairs that have a difference of two, such as 5 and 7, 29 and 31, and 191 and 193. No one had been able to prove this in over 150 years, and top number theorists could not even prove the existence of a bounded prime gap of any finite size.

In 2013, at 58, Zhang published his [proof of a bounded prime gap](#) below 70 million in one of the world's most prestigious journals, the *Annals of Mathematics*. The paper's referees wrote that Zhang, who had been unknown to established mathematicians, had proved "a landmark theorem in the distribution of prime numbers."

Zhang became an overnight sensation among mathematicians and in the [popular media](#). He gave talks around the world and was awarded the Ostrowski Prize, the Cole Prize, the Rolf Schock Prize and a MacArthur fellowship. Zhang, the reticent mathematician whom no one had wanted to hire, received multiple job offers and decided to join the faculty of the University of California, Santa Barbara, in 2015.



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“I hope I can solve a few more important problems just like this,” Zhang said in his 2015 interview. Even as other mathematicians work to [drive the bounded prime gap closer to two](#), Zhang has moved on, returning to his work on the elusive Landau-Siegel zeros conjecture.

Zhang ponders this seemingly intractable question on quiet walks along the beach. After taking part in *Quanta*’s photo shoot last winter, Zhang said simply: “I love to live and do my research in the Santa Barbara area.”