

On the importance of not jumping to conclusions

Peter Hall

This is a true story. It is worth telling because it illustrates a remarkable faith in mathematics, and in the capacity of mathematics to improve our lives.

Earlier this year I was invited to a dinner in the US, to commemorate a colleague in an east-coast university Mathematics Department. I was to fly over, give a short talk after dinner, and return home. All costs would be paid, but I balked because of the unreasonableness of the plan. I could not go, I said, because the schedule was so breathless; and if I went, I would have to go for a longer period than proposed, so that I got a little rest.

In the end my arm was twisted, and I accepted the invitation, but other commitments meant I could not be away for long. So I planned to arrive at my destination town at about midnight, give my short talk the next evening, and head home the following morning. It wasn't a healthy timetable, but at least it minimised jetlag on my return.

My indecision caused a problem, however. By the time I had settled on a schedule the Memorial Union was booked out, as too were all the reasonable hotels in town. So I was put up in a rather run-down motel well away from the university campus. It was dilapidated; the carpet was stained, the furniture was battered, the iron (which I had to borrow from Reception) had a black sticky substance on the hotplate, and the ironing board was a 75 cm plank with cloth stapled to it.

My window looked out onto a street which seemed to consist mainly of warehouses. That was good, I thought, because it meant that my room would be quiet at night. However, the night before I left there was a fight in the corridor. The next morning the carpet outside my room was strewn with broken glass from a smashed Exit sign.

Breakfast was included, but was taken from a small tray of stiff sticky buns, the sort that never show their age. The buns, like the iron, were available only from Reception. The morning receptionist, a grey-haired man in his fifties, spent his time hunched over a television set which had obviously seen better days. It was monochrome; the picture revealed itself only in different shades of green. There was a bent wire aerial on top.

The receptionist looked up only if you approached his counter. The breakfast buns were on a table by the door, and so the receptionist and I didn't speak until, on the second morning, I took my bags downstairs to check out. I gave him my name, and he combed through his records, which seemed to be all on paper.

"Your bill is paid by the university," he said. He squinted at the page that represented my account. "Mathematics Department, it says." I nodded.

He looked at me curiously. "What sort of mathematics do you do?"

We have all been asked that kind of question. It is usually part of being viewed as some sort of curiosity, like an exhibit in a sideshow. From this point the conversation generally takes a familiar course.

"I do statistics," I said. "And probability theory."

He looked at me more carefully this time. "Do you know anything about martingales?"

I almost fell over. Here I was, in a decidedly down-market motel tucked between a row of warehouses and a busy four-lane highway, and the receptionist was asking me whether I knew about stochastic processes.

"As it happens, I do know a little," I said. "I'm amazed that you ask. Why do you want to know?"

He explained that he was interested in the stock market, and trying to understand financial mathematics. We talked about martingales for a while. He wanted to understand, intuitively, why the martingale assumption was appropriate in mathematical modelling. (He already knew all about the mathematical definition of a martingale.) So, our conversation turned to fair games, and mathematical gambling models.

Then he asked whether I could explain unit root tests, and ARCH and GARCH models. I found unit root tests a real challenge. However, ARCH and GARCH processes (heavy-tailed stochastic processes that are sometimes used to model financial data) were more amenable to my explanations. Fortunately I had written a paper on the topic two years previously.

We stood there for quite a while, discussing stochastic processes and statistics, while the guests wandered in to collect their stale sticky buns for breakfast. It was a Saturday morning, and no-one was rushing. There weren't many guests anyway, and no-one besides me wanted to talk to the receptionist.

I learned that, contrary to what I had expected, he was not a student. He had last been a student a very long time ago. But he was interested in investing on the stock market, he read widely, and he wanted to understand the mathematical theories that were used to model the fluctuations of stock prices. He went to the university library in his free time, and was teaching himself the theory of stochastic processes.

The longer we spoke, the more I felt that this man was extraordinary. His grasp of stochastic processes was fairly good, but that was only one aspect of his abilities. The most impressive part was his determination to really appreciate which features of the theory were the most important, and why. It was not enough for him to simply understand the theory.

When I finally departed for the airport I felt more uplifted and inspired than I had been for a long time. I had gained a far better impression of this little motel than I had believed was possible. And my impression of the receptionist had soared. Here, among the dust in the backblocks of this college town, I had found a diamond.