Peter Hilton en passant

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Synopsis

This is a decades-long tale of my glancing friendship with distinguished mathematician and mathematics educator Peter Hilton and his constant collaborator Jean Pedersen. Peter's wit, compassion, and support are in full display, though in truth I knew him only "in passing."

On April 10, 2015, as I watched on cable television the 2014 movie *The Imitation Game,* it didn't register in my mind that the young character Peter (played by Matthew Beard) in Alan Turing's World War II, British, Bletchley Park "Hut 8" group was in fact Peter Hilton. The reality is that Peter had been invited and joined the British war-time code-breaking effort on January 12, 1942, when he was eighteen years old and known only as a mathematically talented undergraduate at Oxford University with some knowledge of German. As a result, he became an integral player in one of the most important mathematical applications of the twentieth century: breaking the German Enigma machine code. Postwar, his long career developed into eminence both in mathematics and mathematics education. "One of the most influential mathematicians of his generation," wrote his wife, Meg, in Peter's obituary for the Binghamton, New York, Press & Sun-Bulletin newspaper, following his death at age eighty-seven on the evening of November 6, 2010. In the days after, his life was celebrated and his passing mourned by anyone privileged to have known him, including, I am grateful to say, me.

I met Peter and his long-time mathematical collaborator Jean Pedersen in 1985, when he was sixty-two and eminent, while I was thirty-three, holding just a Master's degree, and only one year into my first professional job, teaching at the Mathematics and Physics Institute (MPI).

The MPI coalesced as a University of Missouri–Kansas City (UMKC) endeavor begun in Fall 1984 for gifted and talented high school seniors from, at that time, the public school districts of Independence, Fort Osage, and Kansas City, Missouri. The MPI was housed in the UMKC Truman campus building just north of the Harry S. Truman Library and Museum in Independence, Missouri, a thirty-minute drive east of the main UMKC campus. Students came to the MPI daily at 7:00 am before their regular high school classes for two periods of college Calculus and college Physics, for which they could earn both high school and free UMKC college credit. In addition, every two weeks, we solicited science, mathematics, or engineering professionals to appear as enrichment speakers. I was hired in the fall of 1984 to coordinate the MPI mathematics program, supervise the three to six high school mathematics teachers working with us, as well as teach UMKC Calculus I and Calculus II.

In the 1984-1985 winter of the first year of the MPI, I was on the hunt for enrichment speakers. I sent a letter of invitation to Jean Pedersen at the Department of Mathematics and Computer Science of Santa Clara University (SCU), where I had earned my B.S. in Mathematics a decade before. That January she replied on behalf of herself and (to my surprise and delight) Peter, saying they could visit in April, asking us to cover local expenses, including a modest hotel (with, they begged, "windows that open"), but that an honorarium was up to us. The date became unworkable for them, so we rescheduled the visit for Friday October 25, year two of the MPI, when she and Peter would be in town for a regional National Council of Teachers of Mathematics (NCTM) conference being held in Kansas City, Missouri. My May 1 response included the following aspiration:

> "Since our goal is to establish a model program to be copied nationally, it will be to our enormous credit to have a world-class mathematician visit our group of talented high school seniors so soon after the start of the program, and we hope by mentioning that fact now, we will perhaps boost our recruitment for next year."

I also asked whether she and Peter would be willing to give a colloquium talk for the UMKC Department of Mathematics. They said, yes, and I later confirmed that the colloquium talk would be scheduled the day before their visit to the MPI.

That summer, in preparation for their visit, I read an article Peter had written for the May-June 1985 issue of *FOCUS*, the newsletter of the Mathematical Association of America, in which he asserted two statements that resonated with me in my new teaching position, and have stayed in my mind to this day:

> "...the only valid criterion of effective teaching we have, however unreliable, is a love of one's subject."

and

> "...mathematics cannot be learned without being understood— it is not a matter of formulae being committed to memory but of acquiring a capacity for systematic thought."

So, in the fall, on the morning of October 24, I gathered Jean and Peter from their hotel for their joint colloquium talk "From Elementary Geometry to Less Elementary Number Theory" scheduled that afternoon in Haag Hall at UMKC. Afterward, both had graciously agreed to meet for an hour with a group of secondary mathematics teachers at our University Center on campus. Friday morning October 25, I picked them up at (yes) 6:15 am, and drove them to the UMKC Truman campus in Independence, Missouri, for their MPI enrichment talks between 7:00 and 9:00 am. Jean discussed "What's Life Without Polyhedra?," and Peter, "Arithmetic Mean, Geometric Mean and Doing without the Calculus." In addition, since the MPI had been awarded a grant from the Missouri Coordinating Board for Higher Education to produce a collection of videotaped mathematics presentations to be available free to all Missouri high schools, of course we recorded their performances. (We later shipped them copies.)

Afterward, they joined some of the MPI staff at brunch, and I drove them to the NCTM conference at the Hyatt hotel in Kansas City. During all those drives over two days, we three talked at length, the conversations rich and free-flowing. Our friendship had begun.

Nine months later on July 18, 1986, I contacted Jean, telling her and Peter that I would attend the International Congress of Mathematicians (ICM) at the University of California, Berkeley, in August, being held in the United States only the second time since the ICM began in 1893. After I arrived that summer at Berkeley, a university from which I had taken classes during the summers of 1972 and 1973 (in particular, my first modern algebra and first

real analysis undergraduate courses), the three of us met on August 6 for a pleasant lunch at Berkel-Berkel restaurant. I admit, I still enjoyed that Peter would spend time in sparkling conversation with me. Later that evening, I ventured out alone to see the film noir classic "Sorry, Wrong Number" (Barbara Stanwyck, Burt Lancaster) at the Pacific Film Archive, which I had discovered in summer 1972, and enthusiastically recommended to Peter and Jean as a rare repository of classic film. After the ICM, I wrote to Jean on August 18 that she and Peter had a "standing invitation" to return to the MPI. She responded soon, thanking me, and saying how they "were both impressed with the number of events you seemed to be able to include in each day at the Congress."

Five months later, January 26, 1987, Jean sent a letter to me at my old apartment address. It was returned to her, but eventually, somewhat battered, found its way to me in early March. Her message was that she and Peter might visit the MPI that fall, our fourth year, but would like a "formal" invitation letter, writing: "Peter and I very much enjoyed seeing you at the Congress. We look forward to our next encounter." Meanwhile, I had simultaneously written her on January 29, enclosing the first three MPI newsletters we had started producing that year, and suggested they might speak at the MPI again if they were in Kansas City for the American Mathematical Association of Two-Year Colleges (AMATYC) National Convention October 28—November 1, being held at the same Hyatt hotel. After reading that battered and delayed message, on March 16, I wrote Jean the "formal" letter she and Peter had requested, having it signed by our MPI Director. They provisionally accepted for October 28.

That April I saw them both at the NCTM national conference in Anaheim, California, where we celebrated MPI high school teacher Sheri Adams receiving a 1986 Presidential Award for Excellence in Mathematics Teaching. While there, Jean and Peter said they preferred Thursday October 29, instead. I think that's where I heard Peter laughingly object to the common (American?) use of the word "evenly" to describe division of one natural number by another without remainder, since not all such divisions involved "even" numbers. (For example, one should not say that 3 divides 15 "evenly".)

I wrote Jean in July that my own talk proposal had been accepted for the AMATYC conference, confirmed their October talk date for the MPI, and

mentioned that there would be an Actors' Ensemble show playing in town they might want to see one evening. I had a background at this time of over fifteen years in amateur and sometimes semi-professional theatre, both acting and designing lights. Actors' Ensemble was one of the small, black-box theatres I'd designed for. I now learned that Peter's wife, Meg (Margaret) Hilton, was in fact a professional actress, working on Broadway, and elsewhere. So, Peter and I had theatre in common. I eventually arranged tickets (at no cost to them) to a play on the evening of Friday October 30. I also mentioned that in the August MPI newsletter they would soon be receiving, for our incoming fall 1987 MPI students I'd posed a well-known simple mathematics challenge problem (the first of what would end up being seventy-eight such challenges over the years), asking them to send solutions to share with the students in an effort to apply mathematician George Polya's advice to study multiple solutions to any problem.

> "The sum of a certain number of consecutive positive integers is 1,000. Find all such sets of consecutive positive integers."

On September 1, Jean sent their itinerary, as well as her solution to the challenge problem with an observation by Peter to shorten it. I published my own "teaching" solution in the October MPI newsletter. The answer, by the way, is that there are four such sets:

$$
\begin{aligned}
1000 &= 198 + \cdots + 202 \\
&= 28 + \cdots + 52 \\
&= 55 + \cdots + 70
\end{aligned}
$$

Later, they agreed to present another colloquium talk for the mathematics department while they were in town.

Around 9:00 pm on Wednesday October 28, I picked them both up about twenty miles north of Kansas City, Missouri, at our Kansas City International airport, where they arrived on separate flights to different terminals, and drove them to their hotel. The next morning, I gathered them at (yes, again – intrepid souls) 6:15 am for their joint MPI enrichment talk "Pascal's Hexagon." Peter always seemed energized to speak to our students. In the following December MPI newsletter, I reported on their sunny talk:

> "October 29 saw the return of Jean Pedersen and Peter Hilton, who jointly shared with us some of their latest research concern-

ing how Pascal's Triangle can be meaningfully extended into a hexagon. Their talk pointed out several fascinating relationships between the binomial coefficients in this famous triangular array, and the curiosity of many students seemed to be aroused."

After their early morning exertions, I brought them back to their hotel, then out to lunch. Later at UMKC they presented their colloquium talk "Generalizations of Catalan Numbers and their Interpretations." This was the day I gave them a box of Celestial Seasonings Mandarin Orange Spice Herbal Tea for their hotel room, which Peter instantly liked, and would tell me he drank for years thereafter. We talked about the upcoming AMATYC convention and Peter lightly observed that the association of "Two-Year Colleges" should change its name since it consists of people, not of institutions, and he further laughed that he also disliked the acronym since it reminded him of the word "emetic".

Friday evening October 30, I drove them to the 7:00 pm performance of *The Mystery of Irma Vep* in the Actors' Ensemble Boulevard Theatre Saloon on Southwest Boulevard downtown. Integral to the play is the fact that the name "Irma Vep" in the title is an anagram of the word "vampire". Upon reading this, Peter suggested that the author might have better rearranged the letters to form instead the less artificial "Vera Pim," which yields a much more British-sounding surname.

Finally, Saturday October 31 arrived at the thirteenth annual AMATYC convention in Kansas City, Missouri. My talk was scheduled coincidentally at the same time Peter would give his. So, I did not expect to see him until after I'd finished. When I arrived at the room early, I laid out all my materials and prepared to present "Teaching Calculus I and II at the Mathematics and Physics Institute," assuring my presider I was ready. We waited for an audience. No one appeared. As it turned out, an impromptu announcement the previous day that a special report on Calculus would be presented at the same time as my talk on Saturday led to no one appearing. This is the only time in my career that I attracted an audience of size zero! Humbling, yes. I was surprised, but in truth, more bemused by it all. Even my presider sheepishly asked to be excused to attend that Calculus presentation.

After the convention, on November 4, I wrote to the local program chair to explain why she would find no comments on my talk. Wheels then began to turn. November 10, she called me with a verbal apology. Next, I received

a November 11 letter from the past-president of AMATYC, explaining in detail how the timing came about, and ending with: "I am truly sorry you got caught so severely in that squeeze." The final word arrived in a November 18 letter from the current AMATYC president inviting me to present my talk at the October 1988 convention in Calgary, Alberta, Canada. I eventually decided not to go.

On the other hand, on that Saturday, to no one's surprise, Peter's talk, "The Concrete and the Abstract—Mathematical Friends or Enemies?" was crowded. I know, because after packing up my materials, I walked over to hear him speak. He said later that when, from the podium, he glimpsed me standing at the back of the room, he was surprised and sad for me, knowing immediately what had happened. We laughed about it afterward.

This convention was the last time I saw Peter in person.

After leaving Kansas City, on their behalf Jean wrote me on November 2:

> "Peter and I want to thank you and the Math Dept., and the Institute for all the hospitality we received while in KC. It was particularly nice to go with you on Friday evening. We were most impressed with your theater. I hope it will continue to thrive."

As it turned out, as small theatres often do, Actor's Ensemble shut down about a year later after five years of success. I would continue to design lights for local shows yet another year, when I too shut down the theatre chapter of my life.

Jean also included in that short letter, a quick count of her joint written publications with Peter (forty-three articles and three books at that time) writing: "Gosh it's scary! No wonder we feel busy." To my amusement, as if to unconsciously emphasize her point about being busy, she had in her haste addressed the letter to "Dear Peter"!

After that, every year from 1988 to 2009, the year before Peter's death, I received a Christmas card, handwritten by one of them and signed by both. On June 8, 1989, I sent them a friendly update letter; they responded July 6 from Barcelona, Spain, where Peter was spending the second half of his sabbatical. In my letter of September 2, 1990, a year later, I shared the good news that I had passed three written comprehensive Ph.D. examinations and survived a two-hour oral exam in August. I also described the expository

mathematics talk series I started on the main campus back in spring 1988, and that I'd ordered a first computer for the MPI in 1989 and was now exploring the educational use of mathematics software. Jean responded on September 7 with congratulations, saying she had read my letter to Peter over the phone.

Twelve years later, on December 10, 2002, I boldly wrote to Peter asking whether, despite our long gap in communication, he would write me a letter of recommendation for a tenure-track position that had opened up in my department at UMKC, including with my request my curriculum vitae, two of my published papers, and a few reminders of our past association. To my relief, Peter graciously agreed, and submitted a handwritten letter on my behalf. When I read this letter years later, I was astonished at how complementary Peter had been of me given my paltry record, yet another sign of his deep generosity and continual encouragement. Here's an excerpt:

"December 17 [2002]

Dear colleagues,

I write to give my strong support to the application of Dr. [D.] for a position of Assistant Professor or Associate Professor in your department—though I am quite clear in my own mind that he is fully deserving of the higher rank. I understand that Dr. [D] has held the somewhat anomalous position of non-regular visiting instructor since 1984—I have myself known him since 1985—and it is surely clear that a promotion to a regular rank is overdue. Indeed, the one possible obstruction to such a promotion was removed... when Dr. [D] was awarded his doctorate.

I know Dr. [D] as an energetic and imaginative educator of teachers of mathematics, whose own strong background in mathematics and feeling for what is crucial to effective mathematics teaching have enabled him to inspire many to become better teachers, and—an essential ingredient—to enjoy and appreciate mathematics much more themselves...

However, Dr. [D] has, in the past 5 years, added a further dimension to his mathematical activity, and has become very active in aspects of general topology related to Hausdorff measure... which, in turn, plays a fundamental role in the development of

fractal geometry. I am very impressed by Dr. [D]'s publications in this area, and wish to point out that he may now be said to rank among the very best mathematicians who currently are concerned with questions of mathematical education.

I thus have no hesitation in urging you to take this opportunity to offer a tenure-track position to a mathematician whose qualifications are truly exceptional and whose dedication to good teaching has been demonstrated beyond all possible doubt. I would be delighted to have so valuable a professional as a colleague.

Yours sincerely,

Peter Hilton
Distinguished Professor of Mathematics Emeritus,
State University of New York
Distinguished Professor of Mathematics,
University of Central Florida"

I did not get the job. My next two professional years were rough. So, I was heartened when in mid-December 2004, I read in Peter and Jean's Christmas card, written in Peter's hand:

"We want you to know how much we admire your optimistic spirit and your determination in the face of the very unfair treatment you have received. Of course, you can always count on our support. Warmest good wishes, Peter and Jean."

That same month forged my last link to Peter.

Back in 1982, before we met, Peter had written a foreword to Daniel Solow's masterful little book *How to Read and Do Proofs.* I discovered the book soon afterward (I wonder now if it was in fact Peter who told me about it) and wished I had had such a resource when I was a mathematics undergraduate. Solow wrote in his "Acknowledgements for the first edition":

"For helping to get this work known in the mathematics community, my deepest gratitude goes to Peter Hilton, an outstanding mathematician and educator."

Twenty-two years later, in 2004, I was asked by the publisher to review the upcoming fourth edition, since I had been regularly requiring the book for

some of my classes. When it was printed, in the "Acknowledgements for the fourth edition" Solow wrote:

> "I am especially grateful for the thorough and thoughtful comments of [RD] at the University of Missouri, Kansas City, many of which have been incorporated in this edition."

So, although Peter and I never collaborated and in that sense I only knew him "in passing," I am nonetheless pleased to say our names stand thanked together in the same book.

(Just over five years after we lost Peter, Jean too left us on 1 January 2016.)