Under-represented Then Over-represented

A Memoir of Jews in American Mathematics

by Reuben Hersh

Dedicated to my late colleague and friend, Abe Hillman, a leading creator and organizer of high-school and college problem contests. He was a member of the famous Brooklyn College Putnam-Prize winning team of Bellman, Hillman and Sherman (1939) and a student of both J.F. Ritt at Columbia and Solomon Lefschetz at Princeton. He became national director of the Putnam Competition and co-author with Jerry Alexanderson of several well-known textbooks.

Over-represented

When I studied at the Courant Institute of NYU from 1957 to 1962, its Jewish (specifically, Ashkenazi) flavor was impossible to miss. Of course, it was in large part the creation of Richard Courant, who came to New York in 1934 as a Jewish refugee expelled by Adolf Hitler from his post as the leader of the great and famous mathematical school at Göttingen in Germany. Two of NYU's most important professors, Kurt Friedrichs and Fritz John, had been Courant's students at Göttingen. Lipman Bers was also a refugee. Of the younger members of the brilliant faculty, Peter Lax (my mentor and adviser) and his good friend Louis Nirenberg, world leaders in their specialty of partial differential equations, were themselves graduates of NYU (and Jewish). More on the applied side were Joe Keller and Harold Grad (also Jewish, also NYU graduates). Jack Schwartz, a New York Jew, had recently come down from New Haven to join the Courant faculty. Martin Davis had been one of Jack's fellow-undergraduates at City College. Morris Kline (Jewish, of course) had actually preceded Courant as an NYU professor. In addition there were Anneli Lax, Warren Hirsch, Jerry Berkowitz, Lazar Bromberg, Max Goldstein. (What about Wilhelm Magnus, a German like Courant, Friedrichs and John? Only later on did I come to understand that he was not Jewish, but Catholic and a staunch anti-Nazi. He left Germany, not as a refugee from Hitler, but as a postwar immigrant—sponsored and invited by Courant.) And my first 'boss' at Courant, the professor for whom I was a homework grader, had a Jewish last name (Morawetz) and an Irish first name (Cathleen!) I soon came to understand that her father was the well-known Irish mathematician John Lighton Synge, and her husband the well-known Jewish chemist Herbert Morawetz. The only real anomaly here was Jim Stoker—a highly respected geometer and applied mathematician, but apparently a—a what? A WASP (white Anglo-Saxon Protestant)! Yet not such an anomaly. In the mid-thirties Stoker went to the Federal Institute of Technology in Zürich to get a Ph.D. in mechanics. One of the first courses he took was on geometry with Heinz Hopf. He fell in love with the subject and the teacher, and took a Ph.D. in math instead. When he'd finished, Hopf wrote to Courant about this *junger Amerikaner* who would fit in very well with Courant's plans. I never did get to know Stoker,

somehow. I did meet, talk with, take courses from, all the others I have mentioned. Yes, you could say Jews were over-represented at Courant in my time.

But after all, the department had virtually been created by a Jewish refugee, at an institution with a student body that Constance Reid describes as "composed largely of the sons and daughters of working-class Jewish immigrants." I later read, in her biography of Courant [11], that in deciding to settle at NYU, Courant had been counting on New York's large supply of smart youngsters, what he referred to as "a reservoir of talent," to fill the ranks of NYU's graduate program, and indeed, at least to some degree, of its mathematics faculty.

So the "over-representation" there seemed perfectly natural.

From NYU, after five years as a grad student, I was lucky enough to spend two years as an instructor in Palo Alto, California, at Stanford University. A great opportunity for me, to develop mathematically, and to meet mathematicians. First of all, Ralph Phillips, the collaborator of my mentor Peter Lax. Not a New Yorker—a "real American," you might say, if you think New York is not exactly the real America. But still—Jewish! My supervisor in my teaching duties was Paul Berg—like myself, a Jewish NYU product. Three young hot-shots were Don Ornstein, Paul Cohen, and Bob Osserman. My fellow-instructors included Si Hellerstein, Steve Shatz, Lenny Sarason and Rohit Parikh. Rohit is from India and I don't think he is Jewish. The chairman at Stanford was David Gilbarg. Yes, Jewish. Gilbarg's collaborator in nonlinear elliptic PDE's was Bob Finn. Sounds pretty non-Jewish. Remember Mark Twain and Huckleberry Finn? But when I got to know Bob Finn, it turned out that 'Finn' was a shortening of 'Finkelstein.' So what? My own surname, Hersh, was invented by my father, Hersh Fish Laznowski, when he became a U.S. citizen some time around 1921, and decided to become Americanized as Philip Hersh.

In my two years at Stanford, I met some of the department's very famous faculty of European origin. Most conspicuous, at least to me, was Lars Hörmander, a tall blond Swede who was notorious for being mathematically perfect. Certainly not Jewish. (I didn't know that one of his mentors and advisers back in Lund had been the Hungarian Jew Marcel Riesz.) Anyway, the other famous Europeans at Stanford were Stefan Bergman from Poland, George Polya and Gabor Szego from Hungary, Charles Loewner from Czechoslovakia, Menahem Max Schiffer from Israel, Hans Samelson from Germany. And Sam Karlin in Statistics. All brilliant; all Jews.

Well, why not? It has been said, more than once, that by driving the Jewish mathematicians and physicists from Europe to America, Hitler gave the U.S. a present more valuable than anything else you can think of. Stanford grabbed more than its share.

When my two years at Stanford were up, I took employment at the University of New Mexico in Albuquerque, where I have pretty much remained ever since. The chairman here was Julius Blum—another refugee. He had escaped from Berlin, and earned his Ph.D., in statistics, at Berkeley. He was close friends with another statistician in the UNM department—Judah Rosenblatt. Judah's statistics Ph.D. was from Columbia. I was quickly informed of Judah's other big distinction—his grandfather was none other than Yossele Rosenblatt, the most famous American cantor, whose recordings of Judaic musical liturgy were beloved by many, especially by

the Orthodox. Along with Julius and Judah, the department was dominated by Bernie Epstein, author of a popular graduate text on PDE's, and Ignace Kolodner, another refugee, who also was a Courant Ph.D.! This was far from New York or California, in the semi-desert of tri-cultural (Hispanic, Native American, and Anglo-Cowboy) New Mexico.

Jewish over-representation!

Over-representation?

Why? How come so many Jews? A natural question, but one seldom asked in conversation, and never asked in print. Too ticklish, too much chance to be misunderstood, or give offense, or get in trouble one way or the other. You don't want to seem anti-Jewish, you don't want to seem too Jewish, you don't want to seem hung up on the Jewish question; much better to just act like you don't notice something a little unexpected, calling for explanation. Strangely enough, even in historical articles about the immigration of European refugee mathematicans to the U.S. in the 1930s, the words "Jew" and "Jewish" are usually avoided. Now Ioan James, a leading homotopy-theorist who held the famous Savilian Chair at Oxford once held by G. H. Hardy, and since retiring turned to mathematical biography, has published a collection of brief biographies concentrating on Jewish mathematicians and physicists [4]. James' book, coming out in 2009, 45 years after I first arrived in New Mexico from Palo Alto, is almost the first place I have seen Jewish over-representation acknowledged as an obvious fact of some interest.

What exactly is 'over-representation?' Well, I haven't attempted a head count. For one thing, I don't want to get into the question, "Who is a Jew?" Carl Gustav Jacob Jacobi, Gotthold Eisenstein and Leopold Kronecker are always listed as the first important Jewish mathematicians, yet all three were Christians—that is to say, they all three underwent conversion or baptism. A rabbi would say, "Jewish means son or daughter of a Jewish mother." Of Courant's two protégés at the Courant Institute, Kurt Friedrichs was "Jewish" only by marriage to a Jewish wife. Fritz John was "half-Jewish" (on his father's side). In the simplistic view of the general population, they were both somehow "Jewish refugees." Hermann Weyl, Hilbert's greatest pupil, was also "Jewish" only by virtue of his marriage to a Jewish woman. Cathleen Morawetz, of course, is really Irish, regardless of her Czech Jewish husband and married name. The famous topologist Mary Ellen Rudin at the University of Wisconsin is another daughter of gentiles with a Jewish name by marriage. (She was born and raised in rural Texas, and turned into a mathematician by Robert Lee Moore himself.) And what about the famous "refugee" algebraist, Emil Artin? He had no "Jewish blood," but he was married to the half-Jewish Natascha. One of the oft-repeated stories of Nazi idiocy is of the offer Artin received from Helmut Hasse (Courant's successor as head of mathematics at Göttingen). To convince Artin not to leave Göttingen for Princeton in 1934, Hasse actually offered to have Artin's quarter-Jewish children declared officially "Aryan"! (Of course, no such offer could be made to their half-Jewish mother.) (By the way, Hasse, a German nationalist who comfortably served under the Nazis, was actually, secretly, contaminated, by the

blood of a Jewish forebear; in fact, he was distantly related to the composer Felix Mendelssohn. Hasse was very proud of that before the Nazis, but tried to hide it after they came into power. Carl Ludwig Siegel, a colleague and a staunch anti-Nazi, always referred to him as Herr Hasse-Mendelssohn.)

Of course, it's not just America. As a grad student of Peter Lax, I became aware of the "Hungarian miracle," meaning, the amazing number of first-class Hungarian mathematicians in the 1920s and 30s. The list would start with the brothers Marcel and Frigyes Riesz, the collaborators Gabor Szego and George Polya, the "titled" John von Neumann and Theodore von Karman, and Lipot Fejer, Rozsa Peter, Michael Fekete, Paul Erdos, Paul Turan, Alfred Renyi, Arthur Erdelyi, Cornelius Lanczos. No one mentions the very strange fact that every single one of them was Jewish! (Nowadays, of course, not all great Hungarian mathematicians are Jews.)

Or look at Italy, whose Jews are Sephardic, not Ashkenazim [1]. We Ashkenazi don't recognize Italian names as Jewish. When Ascher (later to be Oscar) Zariski left the Ukraine, he went to Rome to study algebraic geometry with Guido Castelnuovo, Federigo Enriques and Francesco Severi. Two out of the three were Jews. (Severi, the non-Jew, would later disgrace himself as a collaborator with Mussolini's fascism.) And there are more Italian Jews in mathematics: Giulio Ascoli, Vito Volterra, Guido Fubini, Luigi Cremona, both Corrrado and Beniamino Segre, Salvatore Pincherle. (I am told that in Italy, a surname that is also a place name is an indicator of Jewishness.) Not to mention Beppo Levi and Tullio Levi-Civita.

So counting American Jewish mathematicians is a hopeless task for several reasons, of which the lack of a definition of 'Jewish' is only one. Nevertheless, if we don't insist on numerical precision, I take it as obvious and uncontroversial that the proportion of Jews among American mathematicians has been, in recent decades, much greater than the proportion of Jews in the US population as a whole. That is what I mean by 'over-representation.'

What is not usually mentioned is the remarkable contrast with the situation earlier—before World War II.

Under-represented

There were really only four prominent Jewish mathematicians in the U.S. before World War II—James Joseph Sylvester, Norbert Wiener, Solomon Lefschetz and Salomon Bochner. Is that not strange? Huge crowds of Jews in the 50s and after—almost none in the 30s and earlier (apart from refugees arriving after 1934.)

Sylvester, of course, doesn't really count. He was English, not American. As a victim of English anti-Jewish discrimination, he came to the U.S. twice. Once, at the very beginning of his career, to the University of Virginia, where he was victimized as a Jew, a foreigner, and a suspected opponent of slavery, and forced to flee in fear of his life after an altercation with a "student" [8]. Then, much later, as a famous algebraist, recruited to create the first real math department in the U.S., at Johns Hopkins. After a few fruitful years there, he went home to

receive, finally, his rightful position at Oxford, as Savilian professor.

Norbert Wiener was M.I.T.'s first, and for a long time almost the only, American Jewish mathematician. From his autobiography [14, 15] we learn the astounding fact that he didn't learn he was Jewish until he was grown up, and then found out that he was possibly descended from the great and famous Jewish physician of the golden age of Arabic rule in Spain, Moses Maimonides. Norbert's father Leo was a Harvard professor of languages, and Norbert felt strongly that his own mathematical attainments entitled him to a position in the mathematics department at Harvard. However, that department never hired a Jew in a regular faculty position, until Oscar Zariski was hired in 1947. Why not Wiener? Well, there may have been more than one reason. Wiener was certainly a great mathematician, but he was also insecure, neurotic, alternately pretentious and apologetic, near-sighted, overweight. Wiener himself was sure that the obstacle to his getting an offer from Harvard was the notorious, unconcealed anti-Semitic bias of the dominant, most influential Harvard mathematician, the great and famous George David Birkhoff. To be fair, Birkhoff was not equally and uniformly hostile to every single Jew. For example, he sponsored an invitation to the young Polish Jewish prodigy Stanislaus Ulam, to become a member of the Harvard Fellows, in 1939 when Ulam was lucky enough to be visiting the U.S. at the time of Hitler's attack on Poland. Ulam was a banker's son, and had fine upper-class Polish manners. And ultimately, after the War, when Zariski received the long overdue offer from Harvard that let him escape from the heavy burden of teaching at Johns Hopkins, he was surprised and pleased to learn that Birkhoff had supported his joining the department. In fact, Birkhoff didn't mind having some Jewish students. There is a solidly authenticated report of a phone conversation between Birkhoff and the chair of the math department at the University of Rochester, where a Jewish refugee had not received the job offer that Birkhoff felt Rochester should have made. It seems Birkhoff assumed, rightly or wrongly, that Rochester's failure to come through with the expected offer was an expression of anti-Semitic bias, for he was heard shouting over the phone at the Rochester math chairman, "Who do you think you are, Harvard?"

James [4] reports a conversation between Birkhoff and an officer of the Rockefeller Foundation (p. 260) "who noted afterwards, 'B. speaks long and earnestly concerning the Jewish question and the importation of Jewish scholars. He has no theoretical prejudice against the race and on the contrary every wish to be absolutely fair and sympathetic. He does however think that we must be more realistic than we are at present concerning the dangers in the situation and he is privately and entirely confidentially more or less sympathetic with the difficulties of Germany. He does not approve of their methods, but he is inclined to agree that the results were necessary.' "

Well, there's only one Harvard. What about the other elite Ivy Leaguers?

Yale? In 1947 Nathan Jacobson, the leading algebraist, was the first Jew to make it into Yale's math department. He wrote about some of his experiences as such, in notes to his collected papers [3]. There's a book by Oren [9] about how the barrier against Jews on the Yale faculty was gradually broken down.

Princeton? That looks better, for the great topologist Solomon Lefschetz joined that depart-

ment as early as 1924. Lefschetz has a remarkable story. His family were Russian merchants who moved to Paris. In France he studied engineering rather than mathematics, because as a foreigner he had no chance for an academic appointment in that country. He came to the U.S. in 1905 to get some practical experience as an engineer. While he was working for Westinghouse in Pittsburgh, a terrible accident occurred. Both of his hands were destroyed! But instead of yielding to despair, he changed careers. He did graduate work at Clark University in Worcester, Massachusetts, earned a doctorate in algebraic geometry, and became a professor in Kansas. There, in total mathematical isolation, he made seminal discoveries in algebraic topology that attracted attention at Princeton. The American topologist James Waddell Alexander, in the math department at Princeton, got Lefschetz a visiting appointment, and then a regular position. In time, Lefschetz became chairman at Princeton, and is given credit for the leadership that made it one of the foremost mathematics departments in the U.S. and in the world. All this is well known, and on the record. What I have not seen in print, but learned directly from Lefschetz's student Abe Hillman, is the fact that, as one would expect, the appointment of the foreign Jew Solomon Lefschetz to the faculty at Princeton was far from easy. The administration of Princeton University resisted bitterly. But Alexander was not only a leading topologist, he was a member of a first-rank family in Princeton, socially and financially [5]. He was a socialist, an active supporter of Norman Thomas's campaigns for the presidency. (He was also a prominent mountaineer; in fact, he preferred to enter his office by climbing the outside of Fine Hall and then coming in through the window.) His great-great-grandfather Archibald Alexander was the first professor and Principal of Princeton Theological Seminary, from 1812 until 1851. Several members of the family were president or vice-president of the Equitable Life Insurance Company. Alexander's father was a well-known artist, whose circle of friends in Paris and America included Claude Debussy, Henry James, Stephane Mallarme, Auguste Rodin, and John Singer Sargent. Because of his social and financial connections, he was able to bring pressure beyond what a mere mathematics department could exert, and succeed in making Solomon Lefschetz a Princeton professor.

Like Norbert Wiener, Solomon Lefschetz did not fit in perfectly with the WASPy academia of the 1920s Ivy League. Gian-Carlo Rota has painted an unforgettable picture of him, in his memoir [12]. Far from being timid or retiring because of his severe physical handicap, Lefschetz was a roaring lion, fearless and intimidating in all mathematical or academic controversies. He became president of the American Mathematical Society in 1935, but not without opposition from G. D. Birkhoff, who wrote in a private letter to the secretary of the AMS, "I have a feeling that Lefschetz will be likely to be less pleasant even than he had been, in that from now on he will try to work strongly and positively for his own race. They are exceedingly confident of their own power and influence in the good old USA." Birkhoff was deluded. Far from favoring Jews, Lefschetz as a Princeton professor usually refused to accept Jewish students, for he thought they probably would not be able to get academic jobs. Perhaps he thought that having a Lefschetz as their adviser would only make it harder for them. Lefschetz did hire the Jewish refugee Salomon

Bochner—a major coup in his campaign to raise his department to world class. But the two great mathematicians soon clashed. My friend Martin Davis recalls that at their beer parties the grad students made sure Solomon and Salomon did not overlap, for they did not speak to each other.

I am also indebted to Abe Hillman for some word-of-mouth history of Columbia University's math department. Like NYU, it is located in New York City, a major center of Jewish population. But unlike NYU, it doesn't seek to identify with the city; rather, it seeks to be viewed as in the same class as the other elite Ivy League schools, Princeton, Yale and Harvard. Indeed, since its New York location might render it susceptible to a large Jewish participation, it has an even stronger motivation to preserve its non-Jewish image. Nevertheless, there was a Jewish mathematician at Columbia as early as 1900. Edward Kasner was the first Jewish appointee, and his appointment is credited to the efforts of his mentor Cassius Jackson Keyser, a leading and influential member of the Columbia math department. J. F. Ritt was appointed in 1921, the second Jewish member of the department, and the adviser of my friend Abe Hillman before he switched from Columbia to Princeton. Hillman told me that as a student Ritt had transferred from City College to George Washington University in his senior year, because he believed that a degree from City had some degree of Jewishness associated to it. He always signed himself as J. F. Ritt, not Joseph Fels, as another measure of self-protection.

A third Jewish mathematician of note was associated with Columbia. Jesse Douglas, a student of Kasner, was one of the very first winners of the Fields Medal, along with Lars Ahlfors in 1936, for his solution of the Plateau problem, to construct a minimal surface bounded by an arbitrary space curve. Douglas's name is almost forgotten today. He is a rather tragic figure, one of several important mathematicians gravely handicapped by what are now called bipolar, and used to be called manic-depressive, symptoms. He had a junior position at M.I.T., which he lost as a result of inability to perform consistently in the classroom. Although a Columbia graduate, and a member of the National Academy of Sciences, he never was offered a regular position at Columbia. According to Hillman, Ritt was opposed to hiring Douglas at Columbia, for two reasons: because it might attract unfavorable attention to have three Jews in the math department there, and also because Douglas was the student of Ritt's rival, Kasner, the other Jew in the math department. Douglas was forced to support himself by holding three different part-time teaching jobs in three different colleges in the New York area. Hillman was able to help him by recruiting support from Herbert Robbins, who was at Columbia, but in the Statistics Department (not the Math Department); and was willing to do Douglas a good turn. With Robbins' support, Douglas did get a full time job at City College.

Here at the University of New Mexico, there was a brief interaction with the "Jewish Problem" in the 1930s, now totally forgotten even though it was written up by Carroll Newsom [7] in his autobiography. Newsom was chairman of the math department at UNM in the 30s, before he went on to higher things as president of NYU and then head of the publishing giant Prentice-Hall. Newsom writes that he was asked to help in the effort to find jobs for Jewish refugees from

Europe, and he decided to do so. In fact, he hired Arthur Rosenthal, who was a well known Austrian Jewish mathematician, co-author of the major treatise *Set Functions*, with Hans Hahn. Newsom writes that he was subject to serious attack by New Mexicans who objected to giving a job to a foreigner and a Jew. Newsom did not give in to this pressure, and in fact took pride in his own courage in hiring Rosenthal. Rosenthal left New Mexico after a few years, and went to Purdue.

So in elite U.S. math departments in the 20s and 30s of the last century there was no over-representation of Jews, but rather under-representation. Ralph Phillips, who got his degree in 1939, had the advantage or disadvantage that his name does not sound Jewish. He applied for jobs in a number of departments, and received invitations for interviews. But then, when his prospective employers met him and learned that he was Jewish, their interest in hiring him evaporated. M.I.T. was one great university that cancelled its interest in Phillips when they found out he was a Jew.

In his article about these experiences [10], Phillips mentions Birkhoff's malign influence. But Birkhoff was not without defenders. Saunders MacLane, who collaborated with G.D. Birkhoff's son Garrett in their well-known algebra textbook, wrote a response defending Birkhoff from Phillips [6]. He did not deny that Birkhoff was a bit of an anti-Semite, but he argued that it was unfair to single out Birkhoff, for in those days its was normal or common to be anti-Semitic—"everybody" did it. MacLane's defense seems defective, however, for Cassius Keyser and James Alexander prove that not everyone was anti-Semitic, even in the 20s and 30s.

Today

What this story makes plain is that there was a great transformation in American society, with respect to Jews, as a consequence of World War II. The U.S. was attacked by Hitler's ally, Japan, and so became committed to all-out war against Hitler and Nazism. But Hitler and Nazism meant first of all, and above all, extreme and unlimited hatred of Jews. So anti-Semitism became un-American. Hitler was America's enemy, and Hitler was the supreme anti-Semite. So it became untenable to exclude Jews from academia, or from Wall Street, or from the Cabinet of the U.S. President.

Once the barriers were down, it turned out that a lot of Jewish students were interested in math, and before long under-representation became over-representation.

It is pretty clear that there used to be major cultural differences between the community of American Jews and the mainstream, non-Jewish, American community. Jews were bookish, studious; they were used to arguing and reading. Their tradition of business and commerce was associated with calculation and arithmetic. All this, it is easy to believe, makes it natural that a disproportionate number are attracted to math. Some people even think that there is something Talmudic about mathematics!

What is certain is that the Jewish domination of American mathematics has passed its peak.

One need only look at the names of the winners of scientific talent contests in recent years. No longer are most of the names Jewish. Instead, most of the names are Chinese, or Vietnamese, or Japanese, or Korean, or Indian. There are some Jewish names, but most of these turn out to be the names of children who have come to the U.S. from Bulgaria or Romania. American-born Jews are a diminishing presence in American mathematics.

Why? Easily explained, although again I only have strong impressions and anecdotal evidence. To put it in brief, we have become assimilated and Americanized. Unlike our grandparents' generation, we are just as likely to play golf and drink cocktails as the gentiles (don't say *goyim*). Our bright youngsters choose law school or business school, not science. We get divorced; even vote Republican. Jews have been accepted in America, and so (allowing for lots of exceptions) we have become, more and more, just like other Americans.

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