Irving Kaplansky: Some Reflections on His Early Years

by Nancy E. Albert

During the fifties and sixties, I knew Irving Kaplansky as a family friend. Forty years later, he provided considerable assistance to me in my work on the biography of my late father, A.A. Albert. In the course of our correspondence and through my interviews with some of Kaplansky's former students and colleagues, I gained a few fresh insights into Kaplansky, the man and the mathematician.

These reflections center on three areas: mathematicians who influenced him, events that helped to shape his mathematical career, and his personal style.

I will refer to him as "Kap," since I never heard anyone except his wife refer to him otherwise. Kap was born in Toronto after his parents emigrated from Poland. The family remained in Canada during his youth, and he enrolled in college at the University of Toronto after high school.

You might say that Kap was blessed with good fortune due to a series of events occurring at critical junctures in his career. When he entered college, Toronto was not necessarily a sought-after destination for aspiring mathematicians. However, Toronto's Mathematics Department stood to gain from the fact that top mathematicians such as Richard Brauer began fleeing Hitler's Germany in the fall of 1933. In a rather perverse way, mathematics on the North American continent benefited from the Nazi regime's "Law for the Reorganization of the Civil Service" requiring removal of Jews from civil service positions in German universities.

After spending a year at the University of Kentucky and a year at the Institute for Advanced Study, Brauer accepted an assistant professorship at Toronto in the fall of 1935. Another new professor, Donald Coxeter, joined Toronto's faculty in 1936. Kap mentioned in an email that the arrival of the two professors "raised Toronto to a new level of magnitude."

In 1938, by the end of his undergraduate career, Kap had already distinguished himself as a member of the winning team in a newly established intercollegiate competition. He took home the William Lowell Putnam prize, which has since come to be regarded as the apex of mathematical achievement for undergraduates.

Fresh out of college, Kap traveled to Chicago for an interlude that would influence his budding career. He described it to me as follows: "The summer long event at Chicago in 1938 was an algebra program dominated by Adrian [Albert].... That summer put a stamp on me that lasted a lifetime."

A.A. Albert, a/k/a "A cubed," had organized the summer program, which began with a groundbreaking Conference on Algebra that introduced cutting edge concepts to a new American audience. Saunders Mac Lane, a younger mathematician spending the year at Chicago after an instructorship at Cornell, assisted Albert in organizing the conference.

Besides Albert and Mac Lane, Kap met a number of mathematical superstars at the conference. Besides his professor, Richard Brauer, and conference organizers Albert and Mac Lane, speakers included L.E. Dickson, Nathan Jacobson, Emil Artin, Solomon Lefschetz and Oscar Zariski. Later that summer, Kap attended a class given by Albert as well as a course called Continuous Groups given by Jacobson.

In the fall, Kap proceeded to graduate school back at Toronto, where he received his M.A. in 1940. Brauer taught at Toronto continuously between 1935 and 1940, that is, from Kap's early years as an undergraduate mathematics student until he completed his Master's degree. In a 2003 email, Kap acknowledged, "I was considerably influenced by Brauer."

In 1940, Kap received a Putnam Fellowship and became Mac Lane's first doctoral student at Harvard University. Within one year, he had completed his dissertation at Harvard and earned his doctorate under Mac Lane.

Kap's first priority upon earning his doctorate in 1941 was seeking a university position. As Ivan Niven observed in a historical account of mathematicians during the first half of the twentieth century, before World War II young Jewish mathematicians became aware that anti-Semitism prevailed throughout the nation's top research universities. Jacobson recalled that, when he had coveted a Harvard faculty position in the mid- to late-1930s, Harvard's permanent mathematics faculty included no Jewish members whatsoever. Because Kap's family was of Jewish origin, it was highly unlikely that he could have received an offer for a tenure-track position at Harvard in 1941. The influential Harvard professor, George Birkhoff, had a well-publicized reputation for anti-Semitism (although he nonetheless maintained friendly relations with both Zariski and Albert).

Despite that handicap, Kap was fortunate in one respect -- Harvard had a non-tenure track position, the Benjamin Peirce Instructorship. Kap glided easily from Putnam Fellow to Benjamin Peirce Instructor in 1941. Although Kap knew that the instructorship was geared to short-term appointments, he managed to retain the position until 1944.

In 1944, a new opportunity arose as part of the U.S. war effort. President Roosevelt established OSRD, the Office of Scientific Research and Development, to coordinate all government-sponsored scientific efforts during World War II. Kap's former doctoral supervisor took over the reins of an OSRD research project at Columbia University known as the Applied Mathematics Group, and Kap secured a position at the project.

The project had three advantages. First, it offered young mathematicians, regardless of their religion or ethnic origin, a good job at a time when jobs in the field of mathematics were scarce. Second, it kept Ph.D. mathematicians and graduate students out of the draft (this affected Kap directly, as he had gained his U.S. citizenship in 1940). And most importantly, it enabled the nation's military defense establishment to tap the extraordinary abilities of research mathematicians like Kap to aid in winning the war. Their contributions were critical to the war effort.

Kap shared a room in New York with a younger mathematician, Daniel Zelinsky, who had interrupted his graduate studies to work at the project. In conversations I had with Zelinsky, he described the war work at Columbia as "research on aerial gunnery." Kap, on the other hand, mentioned that he had been struggling with a mathematical question arising in "aerial photography" when Albert, who was then serving as Associate Director of a sister research project at Northwestern University, guided him over the pitfalls of that subject.

This brings me to the question of Kap's personal style. In an email, I asked him to clarify the nature of his work at Columbia -- was it aerial gunnery or aerial photography? His reply consisted of two words, "aerial photography." Kap's response to the question was precise and to the point, with no surplus verbiage.

After the war, Harvard failed to issue an invitation for Kap to return as a faculty member. In a 2004 email, he explained, "My position at Harvard was strictly temporary: a Benjamin Peirce Instructorship. So -- at the end of World War II I needed a job."

Albert had a good eye for spotting mathematical talent, and lost no time in seeing to it that the University of Chicago offered Kap an

instructorship that would lead to tenure. The addition of Kap demonstrated a slight thaw in Chicago's unofficial freeze on hiring Jewish faculty members -- until then, Albert had been the sole Jewish member of Chicago's permanent mathematics faculty. This signaled the beginning of a trend by top American universities to recognize the past and potential contributions of Jewish mathematicians who had aided this nation's war effort. Exclusionary administrations gradually gave way to meritocracies.

Five decades after the fact, Kap shared his feelings with me about receiving the Chicago appointment. He confided, "Was I ever happy!" However, in 1945, with characteristic verbal economy, he kept those feelings to himself. Perhaps he hoped to avoid jinxing his good fortune by broadcasting it, or perhaps he shied away from discussing it out of modesty. In any case, he breathed nary a word about it to his roommate, Zelinsky, as they packed up their things at the close of Columbia's war research project.

Zelinsky and his new bride, Zelda, soon got wind of the news. They were surprised to encounter Kap on the train headed for Chicago in 1945. Zelinsky was returning to complete his doctorate under Professor Albert's supervision. Now, he learned that his former roommate would soon play a new role as one of his teachers. It was an awkward moment, but the two men quickly overcame it.

After taking an advanced class in ring theory at Chicago from Kap, Zelinsky described Kap's mathematical style as "smooth and elegant," and admired his "natural, conceptual" approach to mathematical research. Kap and Zelinsky remained good friends over the years.

Once more, due to a lucky confluence of events, Kap joined the faculty at a pivotal time, just a year or so ahead of an important shift in the mathematical landscape at Chicago. Albert set the ball in motion as Acting Chair in the fall of 1946. He went to Dean Walter Bartky to complain about the Department's tendency to appoint professors from the ranks of former Chicago graduate students. As a result, he managed to engineer the appointment of an outstanding mathematician named Paul Halmos whose 1942 book, *Finite Dimensional Vector Spaces*, had received rave reviews for mathematical exposition.

Then, Chicago's Chancellor Robert Maynard Hutchins took up the cause by recruiting Marshall Stone, the son of the U.S. Supreme Court's Chief Justice. At the time, Stone was well ensconced at Harvard, and was in no hurry to come to Chicago.

Hutchins originally offered Stone a distinguished service professorship in the Mathematics Department and nothing more. That did not sit well with Stone, who wanted a free hand in shaping a department that had weakened during the war. Hutchins capitulated by upping the offer to include the chairmanship as well as the distinguished service professorship. Stone accepted because he believed that the situation at Harvard was stagnating and he saw the opportunity to put his stamp on the Department at Chicago, which had five vacancies due to retirements and resignations.

Stone took over with a series of new appointments that began in 1947 with the appointments of André Weil, Antoni Zygmund and Mac Lane. Stone, who played a rather heroic role in this saga, felt obliged to threaten the University's Vice-President that he would resign if the appointment of S.S. Chern was not approved. The former Harvard professor won the battle, and Chern joined Chicago's faculty in 1949. Stone also added two exceptional junior mathematicians, Irving Segal and Edwin Spanier.

As a result of these developments, Kap became part of the most vibrant, strongest mathematics department in the country at the time. For a young mathematician, working in the midst of such stellar mathematicians must have afforded Kaplansky an amazing opportunity to stimulate and heighten his creativity. Kap was allowed to bloom and prosper in a new era of collegiality where race and religion were no longer barriers to a synergy of talents.

Kap enjoyed a reputation as an outstanding teacher. Several of the mathematicians I interviewed found his teaching style to be engaging and enthusiastic. They described his presentations as "slick and flashy" -- a mark of high praise. Zelinsky recalled that Kap employed drama in class -- he would lull the students into believing that a problem could not be solved and then suddenly surprise them by demonstrating a pattern leading directly to a solution.

I first recall seeing Kap during the early 1950s, although I may have met him a few years earlier. My family had moved into a sprawling East Hyde Park apartment about a mile from Chicago's campus. I can picture Kap at departmental math parties, seated at the piano in our dining room, surrounded by faculty members such as Shiing-Shen Chern and Paul Halmos with their wives. Kap would be playing show tunes and Tom Lehrer songs from memory, and he was always the life of the party.

He was one of the most dashing members of the mathematics faculty, with his athletic build and winning, dimpled smile. Here, I must digress to describe his wife, the vivacious Rachelle ("Chellie"), whom I recollect as being

one of my favorite people. She seemed younger than most of the faculty wives, in part because of her carefully coifed, but flowing, black tresses. She had a lyrical voice, a certain sophisticated elegance, and a kind, pleasant manner.

She earned a reputation within the Mathematics Department as a most charming, capable hostess who brought faculty members together in a way that fostered their mathematical research. She became an asset to her husband's mathematical career and to the Department as a whole. When he became departmental chairman in 1962, she was ideally suited for the role of chairman's wife. Folks that I interviewed still retain pleasant memories of the departmental gatherings that she orchestrated at the Kaplansky home.

Unlike many American mathematicians, Kap did not perceive a sharp dichotomy between his pure and applied mathematics. For example, in the early 1950s, Kap participated in summertime applied mathematics research projects in California. The top-secret projects were given the acronyms SCAMP (Southern California Applied Mathematics Project) and ALP. The origin of the name "ALP" is unclear -- researchers jokingly referred to it as "Adrian's Little Project." The ostensible purpose of these projects was to conduct research in numerical analysis, but they focused on cryptology.

Kap saw these projects through a different lens. He reported, "At SCAMP and ALP we were told that the ultimate objective was cryptanalysis but the problems we worked on were pure algebra (and pretty interesting), factorization of polynomials, groups given by generators and relations, etc.".

Similarly, in reference to a classified Air Force research project at Bowdoin during the summer of 1957, he described it as follows: "Fifteen or so of us simply had fun all day doing mathematics we loved. I am not competent to say whether we contributed anything significant to cryptanalysis."

Kap and his colleagues at the top-secret applied mathematics project did, however, contribute to pure mathematical research. With characteristic modesty, Kap neglected to mention that he and I.N. Herstein produced some significant results in group theory that summer by showing that ABA-groups are necessarily solvable. He described the impact of the project as follows: "[T]here was an important consequence within pure mathematics. ... [B]ecause of Bowdoin ... [Daniel Gorenstein] fell in love with group theory. Ultimately he became the generalissimo of the army of group theorists that classified finite simple groups -- a major achievement of 20th century mathematics."

M.I.T.'s Richard Schafer recalled participating in the Bowdoin project. He reported that Kap kicked off the summer with a fast, charismatic talk to participants. But Kap's presentation was so brief, they were all left gasping for more!

One thing that emerges from the notes Kap sent to me is that he had a joie de vivre, and that joy revolved around pure mathematical research. Even after becoming quite ill, his son Steven reported that he continued to fill up notebooks with his mathematics. Besides mathematics, the love of his family filled his life. He remained wedded to the lovely Chellie and they had three wonderful children -- Steven and Alex, whom he described as "computer experts," and Lucy, whose musical career pleased him a great deal. He was exceptionally proud of all of them. And I might add that, when he first replied to me in 2002, he sounded quite happy that his 10-year old grandson loved mathematics!