ON THE LIFE AND WORK OF MISCHA COTLAR

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The life of Mischa Cotlar is very difficult to imagine for an American or West European mathematician born and educated in a democratic society. In fact, Cotlar's life and mathematical career were uncommon in every sense. Both were shaped by exile and expatriation. His family was de facto expelled from his native Russia by the Bolshevik revolution. His father, an engineer that loved mathematics, music, and chess, managed a mill. That job made him part of the "bourgeoisie," and the Cotlar children were not allowed to attend school. The Cotlars became pariahs and somehow they managed to leave Russia and to settle in Montevideo, Uruguay.

The family was extremely poor, and led an impecunious and harsh existence. The father run a kiosk that sold newspapers. The young Cotlars still could not attend school, but Cotlar's father detected Mischa's mathematical and musical talents. Mischa became an accomplished musician who played the piano in shady cabarets in Montevideo and Punta del Este. At the same time, Mischa studied advanced mathematics by himself and, with the help of the Uruguayan mathematician Rafael Laguardia, moved to Buenos Aires.

The encounter of Mischa with Argentina was magic–he became for ever Argentinian. Once in Buenos Aires, Mischa met several budding mathematicians–Yanny Frenkel, a young student of Rey Pastor; Alberto P. Calderon, a young engineer interested in mathematics; Manuel Sadosky and Cora Ratto, my parents. Mischa married Yanny and the four became close friends. Together they navigated the disagreeable consequences of Peronism–since they were not card-holding members of the Peronist Party they were barred from regular positions at the University of Buenos Aires, and could only get temporary low-paying jobs without future.

Mischa and Calderon were saved for mathematics by an enlightened postwar American foreign policy to attract scientific talent. American mathematicians that started their careers at the end of the 20th century may have difficulty in conceiving that such a clever American policy could have ever existed. During the 1950s, some of the most prominent American mathematicians visited Buenos Aires to scout for bright students. Thus, Zygmund, Birkhoff, Stone and others gave seminars at the university and immediately identified two extraordinary raw talents, Alberto P. Calderon and Mischa Cotlar. At the end of the visit, Zygmund took with himself Calderon to Chicago, while, once again, the fate of Mischa was more convoluted.

George Birkhoff had asked for a Guggenheim Foundation fellowship for Mischa. Unfortunately, Birkhoff died upon return to the U.S., and nobody knew about the fellowship. Two years later, Garret Birkhoff, his son, found the letter from his father asking the Guggenheim Foundation to support Cotlar. Thus Mischa, still without any diploma, went first to Yale to work with Kakutani, and then was recruited by Marshall Stone for the University of Chicago. There he earned, under Zygmund, his Ph.D. in 1953, his only educational certificate.

Immediately after earning his doctorate Mischa returned to Argentina to direct the new Instituto de Investigaciones Matematicas de Cuyo, partially financed by UNESCO. Mischa gathered in this Institute a group of extraordinary talented individuals–Antonio Monteiro, Eduardo Zarantonello, Oscar Varsavsky, Carlos Domingo, and some other young people–that could not work in the Peronist universities. Mischa started an international journal, the *Revista Matematica Cuyana*, where he published his seminal trilogy, including the Almost Orthogonality Lemma. In 1955, another military administration closed the Instituto de Investigaciones Matematicas de Cuyo claiming that it was a Communist organization financed by another

Communist organization, UNESCO.

After the toppling of the Peronist regime, the Universidad de Buenos Aires experienced a spectacular rebirth. The authorities of the newly created Facultad de Ciencias Exactas y Naturales recruited the best scientists available. Mischa joined "Exactas" (as we dubbed our school) as a full professor, and he gave a series of memorable courses. Among the very talented undergraduates he met then, were Carlos Berenstein and Norberto Kerzman. He also shaped the careers of many of the future first rate Argentine mathematicians who later came to the U.S. During the next ten years, "Exactas" was to produce scores of first rate mathematicians and physicists now spread all over the world. Mischa was very active in research and published his results in the series of original monographs edited by Cora Ratto de Sadosky. Among the authors of this memorable series were Laurent Schwartz and Calderon.

In 1966 a new coup d'etat led by General Ongania heralded bad times for the University of Buenos Aires. Ongania ordered a police assault of "Exactas" and ended ten years of one of the most successful experiments in higher education in the world. Mischa was among the six hundred professors and instructors that resigned in protest after the onslaught. He left Buenos Aires, the city he loved. He taught at Montevideo, McGill, Nice and Rutgers. Finally he was appointed Professor of Mathematics at the Universidad Central de Venezuela. Mischa loved Caracas, and was happy to settle there.

In 1974, my family and I were forced to leave Buenos Aires, and we went to Caracas, where I joined the Department of Mathematics of the UCV. In Caracas the Cotlars, the Sadoskys, and the Goldsteins (Daniel and our daughter, Cora Sol) were reunited. The seven of us enjoyed the hospitality of our dear friend, Dr Concepcion Ballester. Concepcion, the mother of Cristina Pereyra, had moved to Venezuela in 1966 and was already a faculty member of the Departmento de Matematicas of the UCV.

In Caracas, Mischa and I began to collaborate in earnest and together we established an ambitious research program. Mathematically, our Caracas exile was extraordinarily productive. Although Mischa was part of the Zygmund school, he had an astonishing intellectual affinity with the Ukranian school of Mathematics lead by Professors Krein and Gohberg, the leaders of the extraordinarily original and fertile school of operator theory. In spite of my analytic upbringing, I could not resist Mischa's daring approaches to operator theory.

In 1980 Daniel, Cora Sol and I moved to the U.S., and Mischa remained in Venezuela. He loved Caracas–the climate, the mountains, the flowers, and the Venezuelans. Mischa and Yanny came to visit us every year, in Washington, DC, Princeton, and Berkeley–and for many years I spent several weeks in Caracas. Thus our mathematical collaboration was not interrupted. When Mischa andYanny decided to return toBuenosAires. Mischa still kept sending me scores of hand-written manuscripts with new ideas that we needed to develop.

During the times we could not be together I continued our joint work on BMOs with Sarah Ferguson and Sandra Pott. I also started a collaboration with VictorVinnikov and Joseph Ball, on the connections between conservative linear systems in engineering and multidimensional scattering, which was essentially an application of the results triggered by our joint work with Mischa. As usual, Mischa's ideas were extraordinary and far-reaching, and blended their originality with a vast knowledge and deep understanding of mathematics.

Mischa's experiences in a country corrupted by decades of authoritarianism made him a

staunch defender of human rights and civil liberties. The horrible perspectives of the Cold War–deterrence by the menace of mutual annihilation–made him doubly aware of the need to ban nuclear weapons and to make scientists realize their moral responsibility as purveyors of knowledge that could be used to kill and maim, and subjugate innocent people. For Mischa, social and ethical issues were not marginal problems. His strong philosophical commitment to pacifism made him to oppose war and violence. Cotlar refused to accept the alienation of scientists who pursued their intellectual endeavors without paying attention to the appropriation of their science by the political and military establishments. He demanded every scientist to be aware of the potential use of her/his results for the consolidation of militarism and the empowerment of individuals identified with aggressive and anti-humanitarian agendas. Therefore, he did not hesitate in demanding his peers to take a moral and political stand against the misuse of science. These strong philosophical convictions lead Mischa to participate actively in worldwide movements for nuclear disarmament. During the period of the Cold War he attended one of the Pugwash conference. Mischa was horrified by the American policy in Vietnam, and in 1968 co-edited in Buenos Aires, together with Cora Ratto de Sadosky and Francisco Bullrich, the magazine "*Columna 10*." This publication offered translations of articles on the Vietnam War that appeared in the American press–*Ramparts*, *The Minority of One*, the *New York Times*, and the *Bulletin of Atomic Scientists*–and offered its readers a vision of the war in the Far East that was systematically ignored by the Argentine media.

Mischa was never trapped into the brainless anti-Americanism of the times, and was never a "travel companion" of the Communists. He was deeply committed to a just peace in Israel/Palestine, and always defended Israel's right to exist. He also rejected the antisemitism barely hidden in many of the contemporary "progressive" agendas. However, as many other pacifists, Mischa could not find a practical way to reconcile his absolute philosophical conviction about the wrongness of killing with the realities of war and peace.

Mischa settled in Buenos Aires when Yanny's mental health deteriorated. He himself was also gravely sick, but he took loving care of Yanny until his death. In spite of his growing physical weakness, Mischa still tried to mobilize the international mathematical community for the creation of a new movement for the ethical responsibility of scientists. Unfortunately, this last appeal did not elicit a meaningful response.

Mischa was an extraordinary person. He was endowed with many talents and the people around him were changed by his touch. All of the many friends that he met in his different endeavors will remember him with love and respect.

Cora Sadosky, Howard University, Washington DC, 20059