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Laura Jean Cameron

TARSKI, ALFRED (*b.* Warsaw, Poland, 14 January 1901; *d.* Berkeley, California, 27 October 1983), *mathematical logic, model theory, set theory, algebra, formal semantics.* For the original article on Tarski see *DSB,* vol. 18, Supplement II.

Tarski and Kurt Gödel are considered the leading figures in the development of mathematical logic and its applications during the twentieth century. Tarski's name continues to be linked with contemporary research in set theory, decision problems, and axiomatic geometry, as well as the metamathematical study of semantical concepts, especially definitions of truth for formalized languages. Through his students and his students' students, Tarski's influence extends far into mathematical linguistics, database theory, and theoretical computer science. Recent biographical research affords new information about significant events in Tarski's life, both in Europe and later in America, and the milieu in which they transpired.

Early Work in Europe. At the Warsaw University when Tarski matriculated in 1918, mathematics, with the other exact sciences, was in the School of Philosophy. After first enrolling in biology, Tarski turned to mathematics under the tutelage of Stefan Mazurkiewicz, chair of the Mathematics Department in Warsaw, and Wacław Sierpiński, set theorist and topologist, and, shortly thereafter, the topologist Kazimierz Kuratowski. He took courses and seminars in logic and philosophy with the philosopher-logicians Stanisław Leśniewski and Jan Łukasiewicz. In the dedication to the collection *Logic, Semantics, Metamathematics* of Tarski's early papers, in both the first and the second editions, Tarski acknowledged the Warsaw philosopher Tadeusz Kotarbiński as a teacher. In 1924, the year in which Tarski was awarded his PhD, he changed his name from Teitelbaum or Tajtelbaum to Tarski and converted to Catholicism. The name change may have been a career move expressive of Polish nationalism and a response to growing anti-Semitism; it was encouraged by Łukasiewicz and Leśniewski. Tarski's work toward the degree was carried out under the supervision of Leśniewski. His PhD diploma mentions examinations in mathematics, philosophy, and Polish philology.

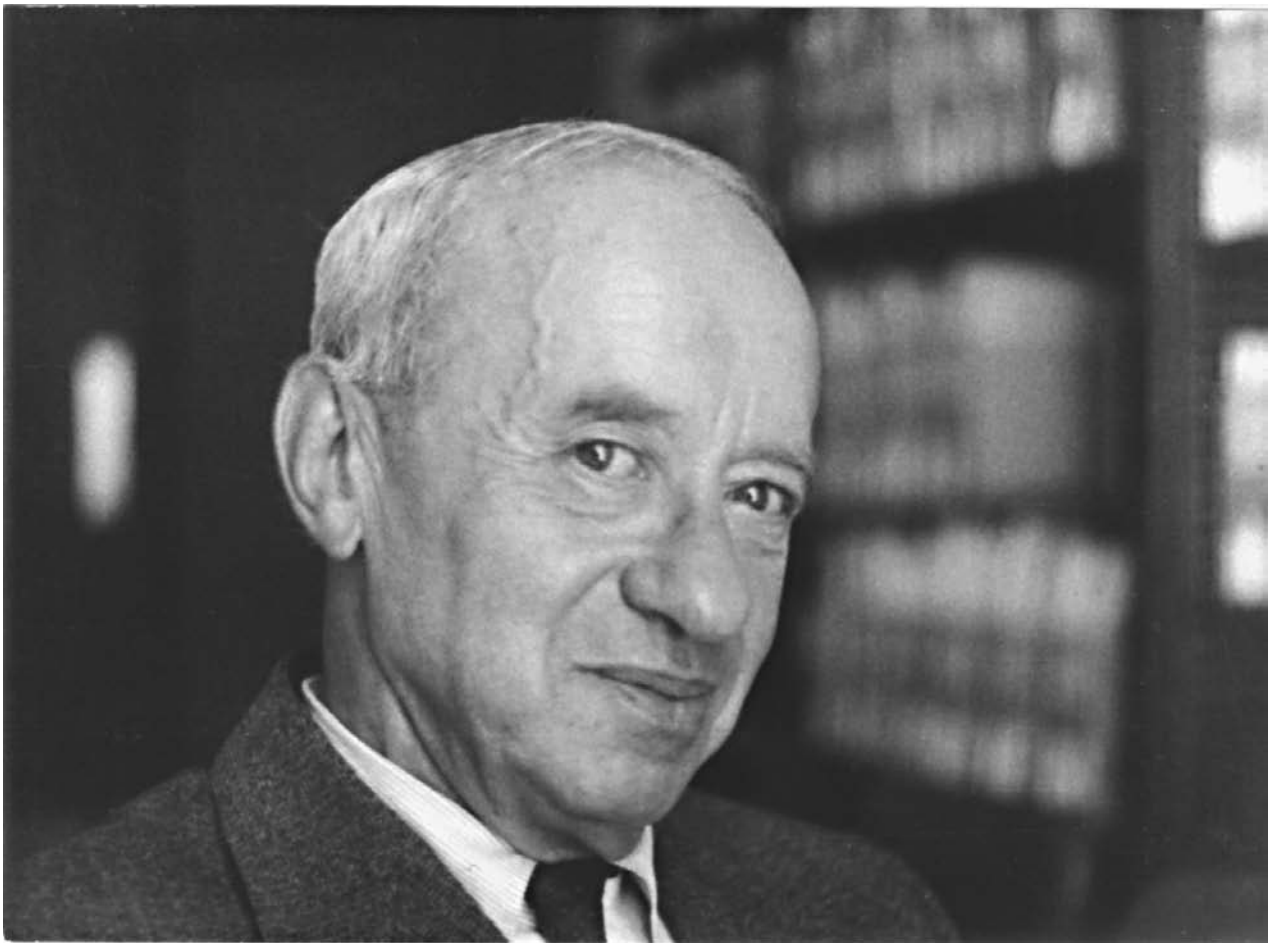
Despite the name change, Tarski's career suffered from the anti-Semitism increasingly evident in Poland and central Europe in the 1930s. He lost his first teaching post, at the Polish Pedagogical Institute of Warsaw, because his female charges complained that their mathematics teacher was Jewish. It also appears that, in 1937, he was denied a professorial post in Poznań because of his religious background.

Between 1928 and 1930, Tarski competed with the logician Leon Chwistek for a professorial post in logic in the Faculty of Mathematics and Natural Sciences at L'viv. It seems that Tarski was sorely disappointed when the position went to Chwistek, who had received a letter of recommendation from Bertrand Russell. Later, Russell would give Tarski warm and enthusiastic support when the latter was searching for a permanent post in the United States.

The significance of Tarski's work on metamathematics and semantics for the Vienna Circle, and especially for Rudolf Carnap, a leading member of the circle, should not be underestimated. Tarski visited Vienna in 1930 and again in 1935; his conversations there with Carnap were major stimuli for the development of the latter's theory of pure syntax and, later, his adoption of a semantical viewpoint. During the 1935 visit, Tarski's presentation of his semantical theory of truth also exerted tremendous influence on the thinking of the Austrian philosopher Karl Popper. During the First International Unity of Science Congress, at the Sorbonne in September 1935, Tarski spoke on his theory of truth and on his study of logical consequence; the conferees were not uniformly enthusiastic in their reception of the new ideas. Also in 1935, Tarski received a grant from the Rockefeller Foundation for research in Vienna and Paris.

Later Work in America. On 11 August 1939, Tarski sailed to New York on the *Piłsudski* in order to attend the Fifth International Congress on the Unity of Science, organized by Willard Van Orman Quine, the noted Harvard University philosopher and logician. While on a visitor's visa in the United States, Tarski also gave a series of lectures. He had brought with him to America only a small suitcase filled with summer clothes. The invasion of Poland and the outbreak of World War II made it impossible for him to return to his homeland. His wife Maria and two children Jan and Ina were to remain in Poland throughout the war; the family would be reunited after a separation period of seven years. Starting in January 1942, Tarski took up a Guggenheim Fellowship at the Institute for Advanced Study in Princeton.

Tarski was instrumental in establishing at the University of California at Berkeley the renowned program in logic and the methodology of science. The proposal for a PhD in that area was approved in May 1957. Tarski was famous as an organizer and promoter of international conventions and congresses, among them the First



Alfred Tarski. *Alfred Tarski, 1968.* **MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH. REPRODUCED BY PERMISSION.**

International Congress for Logic, Methodology, and Philosophy of Science, held at Stanford, California, in August 1960. In 1978 Tarski received the honorary degree Doctor Honoris Causa from the Université d'Aix-Marseille II.

Continuing Influence. In mathematical logic and analytical philosophy, scholarly interest in definitions of truth and notions of logical consequence, both areas in which Tarski did work of the highest significance, continues to be keen. Tarski's student Richard Montague extended his teacher's ideas on formal semantics to natural languages. Dana Scott, another Tarski student, brought Tarski's work on topological models into nonclassical analysis by constructing interpretations for the intuitionistic theory of real numbers. Scott also devised formal semantics for computer programming languages, and calculi of functions and arguments.

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Charles McCarty

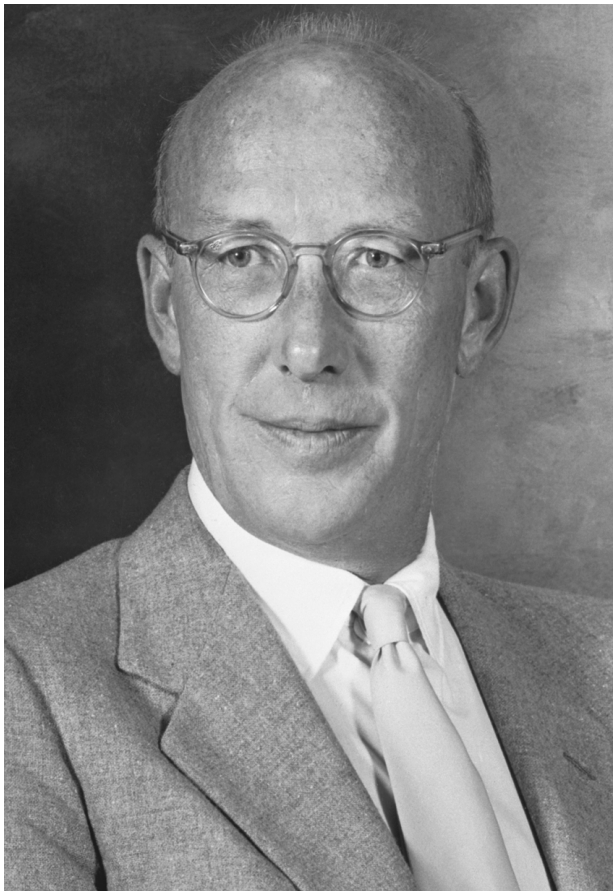
TATUM, EDWARD LAWRIE

(*b.* Boulder, Colorado, 14 December 1909; *d.* New York City, 5 November 1975), *biochemistry, embryology, physiology, genetics, microorganisms.*

Tatum was an American-born biologist who together with George Beadle received the 1958 Nobel Prize in Physiology or Medicine "for their discovery that genes act by regulating definite chemical events." Tatum worked primarily within biochemistry, studying the nutrition and genetics of microorganisms and of *Drosophila*. He was a seminal figure in the development of physiological genetics, made fundamental contributions to understanding biochemical processes and their relation to gene action, and was a pioneer in the use of microorganisms as genetic models. He also was one of the first to experimentally demonstrate the importance of "sex" in bacteria.

Early Years. Edward Lawrie Tatum was the son of Arthur Lawrie Tatum, a pharmacologist, and Mabel Webb Tatum. Carla Harriman was his stepmother. The elder Tatum held a variety of positions, including one at the University of Chicago from 1918 to 1928, and moving from there to the Madison Wisconsin where he had been appointed as a professor of pharmacology at the University of Wisconsin Medical School. Edward Tatum attended the University of Chicago for two years, then transferred to the University of Wisconsin, receiving his BA in chemistry in 1931, MS in microbiology in 1932, and PhD in biochemistry in 1934. Tatum's undergraduate work focused on the growth of bacteria. He continued to work on *Clostridium septicum* in his graduate work, studying the effects of an aspartic acid derivative on its growth. This substance was later shown to be asparagines. His PhD in biochemistry concerned nutrition and metabolism of bacteria, work he carried out under the direction of Edwin Broun Fred and William Harold Peterson. He identified vitamin B1, or thiamine, as one of the required growth factors for microorganisms. (Before this time, the need for B vitamins was underappreciated.) After receiving his PhD he married June Alton on 28 June 1934; the couple would have two daughters, Margaret and Barbara, before divorcing in 1956.

Tatum



Edward L. Tatum. © BETTMANN/CORBIS.

Tatum stayed at Wisconsin from 1934 to 1937, though visiting during 1935 at the University of Utrecht in Holland. At Utrecht he worked with Fritz Kögl, who had himself recognized the importance of biotin, and with Nils Fries. Tatum worked on identifying growth factors in staphylocci, though he was apparently unsatisfied with the results.

At the University of Wisconsin, together with H. G. Wood, Esmond E. Snell, and Peterson, Tatum worked on factors affecting the growth of bacteria, indicating that thiamine was crucial. They showed that vitamins were critical to the growth of a variety of bacterial species. For comparative biochemistry, it was an illustration of the conservation of biochemical processes across diverse species. This suggested that insofar as biologists were interested in metabolism, the simplest method might be to attack problems of growth in microorganisms. That was a theme to which Tatum returned throughout his career.

Work on *Drosophila*. When Beadle moved to Stanford University from Harvard University in 1937, he invited Tatum to join him working on *Drosophila*. Tatum was a