

## HUGO DYONIZY STEINHAUS

Polish mathematician **Hugo Dyonizy Steinhaus** (January 14, 1887 – February 25, 1972) demonstrated mathematical beauty by publishing an entertaining and informative way of answering the question “What does a mathematician do?” In his charming book *Mathematical Snapshots* (1937), he demonstrated mathematical phenomena through the use of photographs and diagrams. The book reflects Steinhaus’ longstanding concern with showing the practical and concrete applications of mathematics as well as its theoretical aspects. The book contains material on such wide-ranging topics as the psychology of lottery players, the arrangements of chromosomes in a human cell, the fair division of a cake, and how to find the shortest possible way to link a dozen locations by rail. Steinhaus asserts that it was designed to appeal to “the scientist in the child and the child in the scientist.” His student Mark Kac said: “To Steinhaus mathematics was a mirror of reality and life much in the same way as poetry is a mirror, and he liked to ‘play’ with numbers, sets, and curves, the way a poet plays with words, phrases, and sounds.”



Steinhaus was born to a family of Jewish intellectuals at Jaslo, a small town at the foot of the Carpathian Mountains, in the Kingdom of Galicia, that is now in Poland. At the time Poland did not exist as a state since it had been divided between Prussia, Russia and Austria in 1772. At that time the region of Galicia became a part of the Austrian Empire. After World War I the Allies established an independent Poland by reversing the partitions. In 1939 Germany and the U.S.S.R invaded the Republic of Poland, which precipitated World War II. In 1945, the former Polish lands came under the domination of the Soviet forces and a Soviet-dominated government controlled it from 1947. In the 1980s the *Solidarity* labor movement led to free elections in 1989.

In 1905 Steinhaus entered Lvov University to study philosophy and mathematics. The next year he was at Göttingen attending lectures by David Hilbert, Felix Klein, Hermann Minkowski, Carl Runge, Edmund Landau, Constantin Carathéodory, Otto Toeplitz and others. In 1911, he was awarded a doctorate with distinction for a dissertation supervised by Hilbert. During WWI Steinhaus served for a short period in the First Artillery Regiment of the Polish Legion and took part in some battles with the Russian troops. After his military service Steinhaus went to Kraków where a chance meeting with Stefan Banach and other young mathematicians led to the establishment of the Mathematical Society of Kraków, which shortly after the war became the Polish Mathematical Society.

In 1916, Steinhaus was appointed to a position at the Jan Kazimierz University in Lvov and a few years later he was promoted to Extraordinary Professor. At Lvov, Steinhaus was one of the leading members of a group of mathematicians who met at “Café Szkocka” (“The Scottish Café”) where they discussed mathematical problems. A book that came to be known as “The Scottish Book” was deposited with the headwaiter of the café. In it the Polish mathematicians and their occasional visitors posed questions and problems. The book was found after WWII by one of Banach’s sons and given to Steinhaus.

During the German occupation in WWII, Steinhaus hid in the country and gave clandestine classes to children. He suffered considerable hardships, but maintained his interest in mathematics during this period. After the war, Steinhaus moved to the University of Wrocław where he established two mathematical centers for teaching and research. Through his efforts, Polish mathematics, which became almost non-existent during WWII, once again developed outstanding mathematicians and mathematics.

Steinhaus did important work on functional analysis, with particular emphasis on orthogonal series, probability theory, real functions and their applications, appearing in some 170 papers. Steinhaus had a passion for games, even to the point of proposing an axiom of set theory to replace the axiom of choice that was an expression in terms of game theory. Besides his hugely successful *Mathematical Snapshots*, Steinhaus also wrote the highly acclaimed *One Hundred Problems in Elementary Mathematics* (1964). His sense of humor was well known. According to Kac, Steinhaus once failed to attend an important meeting of the Committee of the Polish Academy. He received a letter chiding him for “not having justified his absence.” Steinhaus immediately wired the President of the Academy saying that, “as long as there are members who have not yet justified their presence; I do not need to justify my absence.”

Quotation of the Day: “... there cannot be an ultimate or “most trivial” piece of mathematical trivia, so we merely claim that this is very trivial indeed: the names of the seven bridges over the Pregel river which feature in Euler’s problem of the Bridges of Königsberg were the Kramer, Schmiede, Holz, Hohe, Honig, Kottel and Grune.” – Hugo Steinhaus