

George Antheil

Biography.

As an American avant-garde composer, pianist, and author living among the artists of the 1920s “Lost Generation” in Paris, George Antheil wrote cacophonous scores that predicted the development of electronic music decades later. Antheil has also gained recognition for his remarkable scientific collaboration with film star Hedy Lamarr during World War II. Together, they were granted a patent for a frequency-hopping device that used Antheil's stock-in-trade, a piano roll, to protect radio-controlled torpedoes from jamming. This patent was largely unknown until the 1990s, when scientists applied its concepts to spread-spectrum technologies used in computers and cellular telephones.

Born in Trenton, New Jersey, Antheil (pronounced “AN-tyle”) was the son of a shoe salesman from Germany. Raised bilingually, Antheil developed an early interest in art, poetry, and piano, which he began playing at age six. Antheil had limited formal education. He did not graduate high school, but spent much of his late teenage years traveling to Philadelphia and New York City to study under composers Constantine Von Sternberg and Ernest Bloch. During his visits to New York, Antheil gained exposure to leading figures in the Modernist art movement, such as musician Leo Ornstein.

During the early 1920s, Antheil wrote his first technologically-driven compositions with the financial backing of Mary Louise Curtis Bok, the founder of the Curtis Institute of Music, who would sponsor him for two decades. To expand his fame as a modernist composer, he moved to Berlin in 1922. For a year, he worked with classical pianist Artur Schnabel and attempted to put on his own concerts. He then followed an invitation from his idol, composer Igor Stravinsky, to move to Paris. Although Antheil and Stravinsky's relationship soured quickly, Antheil found Paris to be an ideal environment for developing his art. Living in an apartment with his future wife, Boski Markus, above the Shakespeare and Company bookstore, Antheil socialized and collaborated with artists and writers, including Ernest Hemingway and Ezra Pound.

Antheil broke into Paris' musical scene by composing for artist Jean Cocteau. His arrival in the public eye came in 1926, when his debut performance at Paris' Ballets Suédois produced a riot. This uprising was likely orchestrated by filmmakers, who needed a riot scene for a movie, but it added to Antheil's self-declared reputation as a “Bad Boy” of music.

The capstone of Antheil's Paris career was his *Ballet Mécanique*. This composition was conceived as the soundtrack for a film by Fernand Léger and Dudley Murphy, with Dadaist Man Ray serving as cinematographer, but it premiered separately and was twice as long as the film. Along with the coordinated clashing of two grand pianos, electronic bells, xylophones, bass drums, and a siren, and the roar of three airplane propellers, this piece required sixteen player-pianos, or pianola, to operate in unison. This unsentimental, brutal score expressed Antheil's vision for “the first piece of music that has been composed OUT OF and FOR machines ON EARTH.” Foreshadowing electronic musical synthesizers (/Electronic_Music_Synthesizer), Antheil hoped to create music free of “wonderful imprecisions in performance” by coding a symphony of instruments into a punched roll of paper.

At the time, *Ballet Mécanique* was technologically impossible—there was no way to centrally control sixteen rolls of punched paper moving simultaneously—and the composition had to be scaled down to one pianola and a number of humans playing piano. Only recently, through composer Paul D. Lehrman's recreation of *Ballet Mécanique* using MIDI (musical instrument digital interface) synthesizers, have musicians been able to summon his original intent. The Paris opening of *Ballet Mécanique* opened with jeers, praise, and a riot, but the work was ridiculed for various technological malfunctions when Antheil staged it at New York's Carnegie Hall in 1927, causing permanent damage to his reputation.

George Antheil

Birthdate

1900/07/08

Birthplace

Trenton, NJ, USA

Death date

1959/02/12

Fields of study

Music

Antheil returned to Germany in the late 1920s, where he became assistant musical director of the Stadttheater in Berlin. The rise of Nazism drove Antheil away from this work, and he moved back to the United States. Hollywood called, and he wrote more than thirty film scores beginning in the mid-1930s.

In Los Angeles, Antheil became friends with his neighbor, film star Hedy Lamarr (/Hedy_Lamarr). During World War II, Lamarr and Antheil developed an idea to give Allied forces an edge in naval warfare: using frequency hopping to encrypt the radio signals directing their torpedoes. Lamarr's former husband, Fritz Mandl, a Jewish munitions manufacturer from Berlin, introduced her to this idea. Antheil's contribution was rooted in his earlier research in musical technology. The player piano, which, by the 1940s, had been replaced by the radio and phonograph as the center of entertainment in American homes, continued to fascinate Antheil. He applied its central mechanics—a spool of punched paper driven by a complicated system of pneumatics—to a system that would mask radio frequencies. In short bursts, the piano roll randomly changed the signals that the control center sent to the torpedo. These bursts operated within a range of 88 frequencies, which matched the 88 black and white keys on a piano keyboard. This technique effectively masked the signal, because the enemy lacked the power to scan and jam all of these frequencies.

Although this "Secret Communications System" earned U.S. Patent 2,292,387 in August, 1942, the Navy rejected the plan. Decades later, this patent's ideas were developed for spread-spectrum communication technology, including code division multiple access (CDMA), Bluetooth, and coded orthogonal frequency-division multiplexing (COFDM).

Ballet Mecanique



Further Reading

Richard H. Rhodes, *Hedy's Folly: The Life and Breakthrough Inventions of Hedy Lamarr, the Most Beautiful Woman in the World* (New York: Vintage, 2011).

Paul D. Lehrman, "Blast from the Past," *Wired* (Nov. 1999), 200-224.

George Antheil, *Bad Boy of Music* (New York, 1945).

Paul D. Lehrman's recreation of *Ballet Mécanique* (<http://www.antheil.org/>)

U.S. Patent 2,292,387 (<http://pdfpiw.uspto.gov/.piw?Docid=02292387&homeurl=http%3A%2F%2Fpatft.uspto.gov%2Fnetacgi%2Fnph-Parser%3FSect2%3DPTO1%2526Sect2%3DHITOFF%2526p%3D1%2526u%3D%2Fmetahtml%2FPTO%2Fsearch-bool.html%2526r%3D1%2526f%3DG%2526l%3D50%2526d%3DPALL%2526S1%3D2292387.PN.%2526OS%3DPN%2F2292387%2526RS%3DPN%2F2292387&PageNum=&Rtype=&SectionNum=&idkey=NONE&Input=View+first+page>)

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