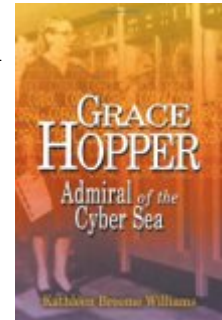


Kathleen Broome Williams. *Grace Hopper: Admiral of the Cybersea*. Annapolis: Naval Institute Press, 2004. xvii + 240 pp. \$32.95, cloth, ISBN 978-1-55750-952-9.



Reviewed by Elizabeth Bruton

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The genre of the early history of digital electronic computing (henceforth referred to as "computing") has expanded rapidly in the past few years, in terms of both academic and popular publications. The subject itself has developed in scope, range, and overall scholarly investigation of publications. *Grace Hopper: Admiral of the Cybersea* is the first full biography of Grace Murray Hopper and is a welcome addition to the genres of computing history and military biography. This publication adds new layers to the discussion and debate of computing history in two distinct areas. These are the gender imbalance within the active working community, and the relationship between the early growth usage in the military and governmental context and the later post-World War II commercial developments. Williams uses numerous interviews with Hopper's colleagues and family, alongside newly examined archival material, to flesh out her life and incredible achievements. Within this structure, the author examines computing, particularly software, spanning Hopper's lengthy career from World War II to the late 1980s. Williams's previous two publications were on the subject of military technology in

the U.S. Navy during World War II and female scientists in the U.S. Navy during World War II, respectively. In this latest publication, the author combines her extensive knowledge, expertise, and enthusiasm gained from these previous endeavors to produce an illuminating and engaging tome.

Grace Hopper: Admiral of the Cybersea is structured in a simple chronological fashion, with individual chapters focusing around central themes of Hopper's life. While describing Hopper's life in fascinating detail, the focus for the biography is her extensive service in U.S. Navy computing, particularly during World War II. Williams describes this as "the pivotal point in Hopper's life ... and the catalyst for all her later successes" (p. xiii). However, the author goes on to emphasize that Hopper's military service served as a foundation on which to build: her exceptional success in the world of computing also lay with her innovation and tenacity. Hopper not only kept up with innovations and progress within the field itself, but also was, in fact, often the source of these developments. It was this determination,

alongside her valuable computing skills, knowledge, and experience, that determined Hopper's success in the male-dominated field of computing, despite her age and gender.

The author begins with Hopper's early life, coming from a long and illustrious family background that included distinguished naval service. Hopper had a series of amusing childhood anecdotes she recounted during interviews to illustrate her single-minded determination. Strong-willed, tenacious, intelligent, persistent, independent, and mathematical, Hopper was very much like her mother and had been brought up in a household where the children were encouraged to learn, question, evaluate, and discuss. Hence, Hopper went on to study applied mathematics in college, taking and teaching courses in probability, statistics, and game theory, amongst others. During WWII, Hopper insisted on serving in the U.S. Armed Forces, despite belonging to a reserved occupation. In December 1943, Hopper joined the U.S. Navy Reserve, and would maintain a strong connection with this branch of the military for the rest of her life. Hopper was allocated to work at the Bureau of Ships (BuShips) Computation Project at Harvard under the command of Howard Aiken, working on Mark I and Mark II electromechanical digital computers that were halfway between mechanical calculators and electronic computers. The author emphasizes the innovative nature of this work and its influence on the postwar computer industry and Hopper herself. Hopper "spent the rest of her life impatiently pushing ahead, at the cutting edge of the rapidly developing field to which the Navy had introduced her" (p. 51).

After the war, Hopper remained at Harvard working on military computers until 1949 when she joined the company of Universal Automatic Computer, working on the new world of commercial and business computing. However, there was still a strong tie with the military: most of Hopper's fellow employees were ex-military and the

military was one of the major purchasers of commercial computers. As Williams points out, "Hopper was a member of a relatively small cadre of navy-trained computer engineers who formed the core of the field after the war and who greatly influenced its development" (p. 100). At this point, the structure of the book changes from a close examination of the microcosm of computing at Harvard to the macrocosm of commercial development and mathematical and scientific application. This shift reflects the overall change in computers at this time, from a narrow hardware-focused approach to the new world of software and data processing. By 1960, Hopper was heavily involved in the development and standardization of Common Business Oriented Language (COBOL) in two main areas: the overall syntax and structure of the language itself, and a compiler for the language. In 1967, Hopper was called back to active duty in the regular Navy in Washington, D.C. where she produced a standardization of COBOL for the Department of Defense and, indeed, most of the computer industry.

In 1977, Hopper moved to the newly formed Naval Data Automation Command where she continued her remarkable and well-earned success until she finally retired from active duty in 1986 at the age of seventy-nine. Hopper immediately began working at Digital Electronic Corporation as a full-time senior consultant. Despite maintaining an active and up-to-date knowledge of computing, in other areas Hopper was in some ways old-fashioned. This mindset was particularly obvious in her oblivious attitude to the gender imbalance within computing and technical workplaces. The author suggests this attitude reflected Hopper's overall personality whereby she could be overly loyal and uncritical. However, this attitude was a minor flaw in an incredible and unique individual. Williams concludes, "Always unconventional in her thinking, Hopper scorned the customary and traditional, was impatient with the status quo, and approached problem-solving with instinctive innovation. Putting aside the excessive

rhetoric and the overblown claims that were made on her behalf, Hopper did make real contributions to programming languages and information processing" (p. 194).

This volume is clearly well written, well researched with an attention to detail and a very readable writing style. The author often explains complex military, technical, and computing theories, ideas, and structures in a concise and comprehensible fashion. However, this comprehensible writing style is occasionally let down by the overly rigid structure of the overall narrative. For the most part, this framework is mostly useful but sometimes makes the introduction of concurrent background information difficult and ineffective. In addition, as the sources of the primary material for this biography would suggest, some arguments can be quite one-sided. The author sometimes fails to criticize her subject in any real and meaningful sense. Despite these minor criticisms, this is a superb publication that engages well with the subject. It provides excellent and detailed practical examples of the development of the computing industry and uses these to present well-structured and cohesive arguments. An enjoyable read, this meticulous account of Hopper's life will surely encourage readers to seek both past and future publications by this talented and engaging author.

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