

## Book Review

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***Grace Hopper and the Invention of the Information Age***, by Kurt W. Beyer, September 2009, MIT Press, ISBN 978-0-262-01310-9.

Given the colorful legends surrounding Admiral Grace Hopper, I read *Grace Hopper and the Invention of the Information Age*, by Kurt W. Beyer, hoping to find personal insight into the character, motivations and circumstances leading to Hopper's outstanding contribution to the computational sciences. While informative about the people, politics and events affecting Hopper's career, the book gave me less insight into Hopper as a person than I expected. This may be an outgrowth of the information source for the book: it was primarily extracted from transcribed oral histories from a number of different sources. Beyer gravitated toward specific confirmable events from these histories in his discussion of Hopper's career.

Beyer starts with an extended introduction on the above: his information sources, the different focus of his book relative to typical biographies and some anecdotes about Hopper. Being more interested in the subject of Grace Hopper rather than the meta-subject of the different genres of biographies, I found parts of this section tedious to read.

Beyer then proceeds with a brief biography of Hopper's early life that provides some motivation for her early aspirations. In the early 1900s, it was not unusual for females to pursue higher education and Hopper's mother, Mary Campbell Horne Murray, was a talented mathematician and her father, Walter Fletcher Murray, was an insurance executive. As such, her parents provided resources and a nurturing environment for Hopper's study in math. She pursued undergraduate work at Vassar and went on to receive a PhD in math and physics from Yale in 1934. One small inaccuracy in Beyer's book is the assertion that she was the first female to obtain a PhD in math from Yale. That honor reportedly goes to Charlotte Cynthia Barnum who earned her PhD at Yale in mathematics in 1895.

Murray married Vincent Hopper, another doctoral candidate, in 1930. After they graduated they both went on to be professors. Grace Hopper obtained a position as a professor of math at Vassar. The bomb-

ing of Pearl Harbor on December 7, 1941 completely changed their lives. The shock they felt from the attack and events that unfolded afterward made them feel compelled to enlist and serve in the war effort. The book mentions that they eventually divorced, but there is no discussion of the causes of the divorce or its impact on Grace Hopper. It would be interesting to understand if the pressure of their new careers drove them apart or if their personal differences prior to Pearl Harbor gave the Hoppers an incentive to take on new careers and separate lives.

Hopper's enlistment in the Navy is the point at which Beyer's analysis of her career truly begins. Because of her math background, Hopper was assigned to the Harvard Computation Laboratory (HCL) with Howard Aiken and his creation, the Mark I computer. The book mentions that she was coldly received in the lab because of being female, but shows that her competence eventually earned Aiken's approval. It was in this period of her career that she helped coined the famous term "computer bug" after a moth shorted out a circuit in the Mark I. During this time, she became one of the nations first programmers, creating coding and verification practices for the pre-punched tape and mechanical programming interfaces on the early computers. The book is also rich in details on Aiken, the design of his computing machinery and the military atmosphere he maintained within the lab. The early chapters are as much a biography of Aiken as of Hopper and show their effectiveness as a team in solving challenges in the wartime-operation of early computing systems.

After leaving HCL in 1949, Hopper joined the Eckert–Mauchly Computer Corporation (EMCC) to work on programming for the UNIVAC computer. The company had financial problems and was soon sold to Remington Rand. It was during this period that she developed the FLOW-MATIC language that was the precursor to the COBOL standard. These languages were developed with the goal of making them readable and accessible to a wider population. This trend continues today with the use of graphical languages that abstract the computer architectures and coding details away from the functions required by today's programmers. While reading this section of the book, I was struck by how little politics has changed in the world

of computing machinery. It is still a common strategy to enforce the use of a favored methodology by mandating a standard that requires its use.

Each chapter of Beyer's book reads like a complete essay on a particular aspect of Hopper's career. The topics range from Hopper's interactions at HCL, development of computer programming, the early computer science community and symposia, to her career after the war developing compilers and the COBOL standard at Eckert-Mauchly Computer Corporation and Remington Rand. The most interesting parts of the book for me were details about the evolution of standard computer practices such as flow-charting, early programming syntaxes and principals of debugging. Her philosophy of proper computer programming practice pervades today's software engineering methodologies.

The primary weakness I found with the book is that Beyer frequently re-uses previous examples and re-examines them from the perspective of the current chapter's subject. While this makes each chapter stand as a complete essay in its own right, it also makes the biography as a whole extremely repetitive and pedantic. I really had to force myself to read this book all the way through, and that disappointed me as I find Grace Hopper to be an inspiration in her accomplishments.

There are also some areas I would have like to have seen explored more. The subject of the divorce and its impact on her life and career was surprisingly short.

There is no mention of the impact of Vincent Hopper's death on Grace. Also missing was a discussion of her recovery from alcoholism and the impact on the rest of her life. I also feel that the challenges of being a pioneering woman in the field of computing were not sufficiently addressed. Her competence and vision produced amazing accomplishments, but how far could she have gone without either the overt sexism discussed in the book, or the underlying dismissive attitudes that were omnipresent but not adequately detailed in the oral histories. Mixed attitudes and missed opportunities can be very subtle, but insidious in their overall effect on one's confidence and career. They also tend to get omitted from oral histories because they are simply not flattering to express.

My recommendation for this book is then mixed. There are a number of interesting facts about Hopper and the early history of the computing community that are nicely collated here. It has a detailed view of Grace Hopper's accomplishments, her colleagues, the development of technology and programming practices and the political forces shaping the development of the information age. However, the repetitive nature of the subject matter combined with the lack of personal insight into Hopper's mind and motivations detracted from my enjoyment of the book.

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