

Women Becoming Mathematicians: Creating a Professional Identity in Post-World War II America

Reviewed by Judy Green

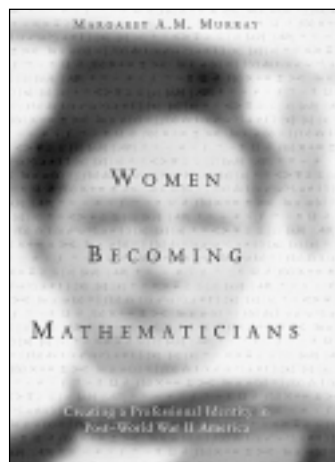
Women Becoming Mathematicians: Creating a Professional Identity in Post-World War II America

Margaret A. M. Murray
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In *Women Becoming Mathematicians: Creating a Professional Identity in Post-World War II America*, Margaret A. M. Murray gives a fascinating picture of thirty-six women who earned Ph.D.'s in mathematics in the United States during the twenty years between 1940 and 1959. Her careful examination of the lives and careers of these women is based on the extensive interviews she conducted with them. Murray succeeds in providing a coherent collective picture of her interviewees, and in this respect her book is unique among books that examine the lives and careers of women mathematicians.

The group of women Murray interviewed includes some whose names are well known in the mathematical community, although most of the names will not command general recognition, even among mathematicians. Among the best-known women Murray interviewed are Evelyn B. Granville (Yale University, 1949), the first African American woman to receive a Ph.D. in mathematics;¹ Cathleen S. Morawetz (New York University, 1951), the first woman elected to the applied



mathematics section of the National Academy of Sciences and the second woman president of the AMS;² Lida K. Barrett (University of Pennsylvania, 1954), the second woman president of the Mathematical Association of America;³ and Alice T. Schafer (University of Chicago, 1942), the

second president of the Association for Women in Mathematics.⁴ Murray's interviewees are self-selected, first by either maintaining membership in a mathematical organization or by staying in contact with those who did, and then by responding to a solicitation for an interview. They are drawn from the approximately two hundred women she identified as having received Ph.D.'s during the middle fifth of the twentieth century. These two hundred women represent 6 percent of the total number of Ph.D.'s in mathematics granted by American institutions during those two decades. For comparison, during the rest of the twentieth

Judy Green is professor of mathematics at Marymount University, Arlington, Virginia. Her e-mail address is judy.green@marymount.edu.

¹The only other African American woman to receive a Ph.D. in mathematics between 1940 and 1959 was Marjorie Lee Browne (Michigan, 1950).

²The first woman president of the AMS was Julia Robinson (Berkeley, 1948).

³The first woman president of the MAA was Dorothy Bernstein (Brown, 1939).

⁴The first president of the AWM was Mary Gray (Kansas, 1964).

century the representation of women among all Ph.D.'s in mathematics awarded by American institutions was 13 percent (1900–19), 14 percent (1920–39), 8 percent (1960–79), and 20 percent (1980–99).

Murray builds her book on a conceptual framework that she calls *the myth of the mathematical life course*. According to Murray the myth supposes that “the process of becoming a mathematician is one of single-minded, lifelong dedication to the ideal of research excellence” (p. 199). Murray uses masculine pronouns in her lengthy description of the myth, since she will show that it is not consistent with the mathematical life course of the women she interviewed. The myth, as Murray articulates it, includes the following elements:

- “[M]athematical talent and creative potential emerge very early in childhood....”
- “In college, that the major will be mathematics is a foregone conclusion, and the student proceeds from college to an elite graduate school.”
- “In graduate school, the student comes under the tutelage of a powerful mentor, under whose direction he writes a doctoral dissertation that makes a significant contribution to his area of study....”
- “[H]is mentor assists him in landing a post-doctoral research position at a similarly elite doctorate-granting department of mathematics, and afterward he goes on to one or more positions at comparably distinguished universities, where his creative achievements are rewarded with tenure.”
- “The mathematician is extraordinarily productive in research from his late teens until his early forties and during this period does his best work....”
- “It is very helpful if the mathematician has a spouse who will take care of domestic and family concerns and provide him with a peaceful home environment that supports his creative work.”
- “In the later years, research productivity continues, albeit at a somewhat lesser rate....”
- “It is perhaps possible, later in life, for the mathematician to enjoy some hobbies and diversions, but his primary concern is and continues to be mathematics.” (p. 16)

Although we all are aware of male mathematicians who do not closely fit the mathematician of this myth, I have heard enough mathematicians espouse various parts of it to know that there are many in the mathematical community whose expectations of themselves and others reflect much, if not all, of the myth as Murray describes it. Murray makes the point that, although in many respects the myth dates back to the nineteenth century, it gained power in the post-World War II period, particularly through personal accounts

written by and about male research mathematicians. Using the recollections of women mathematicians whose lives do not conform to the myth, she provides a counterbalance to the impressions left by these biographies and memoirs.

Women Becoming Mathematicians starts with a short historical introduction that includes a description of the growth of participation of American women in mathematics from the late nineteenth century until just before World War II. Murray also describes the division of the mathematical community into teachers and researchers that occurred around the time of World War I as well as the participation of women in mathematics during World War II and afterwards. She then gives us an introduction to the women Ph.D.'s of the 1940s and 1950s in the context of American society at the time. Although Murray notes that biographical information on many of these women exists in standard reference sources, she does not provide sufficient data to substantiate her assertion that her interviewees constitute “a *representative* sampling of the professionally active women mathematicians of this generation” (Murray’s italics, p. 22). This is the only lapse in the book’s otherwise excellent documentation.

Besides a set of norms against which the careers of her interviewees can be assessed, the myth provides a chronology on which the book is organized and on which Murray’s questions to her interviewees were based. Chapters 3 through 8 are entitled: Family Background and Early Influences; High School and College; Graduate School and the Pursuit of the Ph.D.; Interweaving a Career and a Life; Teaching, Research, and the Question of Identity; and Dimension of Personal and Professional Success. In each chapter Murray provides the relevant information concerning the lives of some of her interviewees and shows how they do and do not correspond to the norms of the myth. She also shows how her interviewees overcame obstacles, some of which were obvious artifacts of the myth. As Murray points out, these are the stories of women who succeeded in becoming mathematicians, women who “had the patience, the stamina, the financial and moral support of families who helped them to overcome the obstacles” (p. 99). From these success stories, which are rich in detail, we learn that not only do these women not follow the model of the myth of the mathematical life course, they do not follow any single model. In addition to presenting the recollections of these women, Murray conveys their feelings towards various incidents in their lives, such as pride, acceptance, anger, and bitterness.

Murray’s interviewees come from all types of backgrounds. Some were raised in cities and others on farms, some had parents without high school degrees and others had parents with doctorates, some had no siblings and others had many siblings,

some were educated in public schools and others were educated at home. In very few cases did mathematical talent become evident in childhood.

A significant portion of *Women Becoming Mathematicians* centers on college and graduate school training. Again the interviewees had vastly different experiences. They attended women's colleges, women's coordinate colleges of men's schools, and public and private coeducational colleges and universities. Most lived at home for all or most of their college experience, and more than one-third had graduated from college by the time they were twenty. Almost all the interviewees spoke of at least one teacher who could be considered a mentor, and most received encouragement from male teachers. Most did not see a mathematics major as a foregone conclusion; many found in college an explicit message that women do not become mathematicians.

Most of the interviewees did not proceed quickly from the undergraduate degree to the doctorate. Some taught; some raised families. Although more than one-third of the interviewees were very young when they received their undergraduate degrees, very few received their doctorates by the age of twenty-five. Only twenty schools appear on the list of institutions that granted Ph.D.'s to the thirty-six interviewees. New York University and the University of Chicago granted the most, six and five respectively. While NYU and Chicago were clearly hospitable to women graduate students, they were not as encouraging as the numbers might imply. NYU assigned its women graduate students editorial and clerical tasks early in their graduate student careers, although they usually were given more explicitly mathematical work later. Furthermore, while NYU often offered employment to its new Ph.D.'s in applied mathematics, typically the males were hired into tenure-track positions while the females were offered research associateships. On the other hand, NYU prepared its women Ph.D.'s in pure mathematics to enter the larger mathematical community. Chicago did not; instead it trained women to be college teachers rather than researchers.

The longest chapter in *Women Becoming Mathematicians* looks at the interviewees' lives and careers subsequent to graduate school. Murray describes two models for an academic career: "the women's college model, which entailed nearly selfless devotion to the college and emphasized teaching generally to the exclusion of research, and the emerging model of the research career provided by the myth of the mathematical life course" (p. 159). She notes that the latter model was not generally available to women, since the universities that saw themselves as research institutions were not hiring women onto their faculties. Nonetheless, of the three-quarters of the women who had academic careers, Murray

Interviewees for *Women Becoming Mathematicians*

In the following list of the thirty-six women who were interviewed for the book, a surname in italics denotes the name under which the Ph.D. was granted; if a name appears in parentheses, it was later dropped. The women and the school and year of their Ph.D.'s are:

Anne *Lewis* Anderson (Chicago, 1943)
 Winifred *Asprey* (Iowa, 1945)
 Lida *Barrett* (Pennsylvania, 1954)
 Grace *Bates* (Illinois, 1946)
 Barbara *Beechler* (Iowa, 1955)
 Janie *Lapsley* Bell (Illinois, 1943)
 Anne *Whitney* Calloway (Pennsylvania, 1949)
 Mary Dean *Clement* (Chicago, 1943)
 Jane *Cronin* Scanlon (Michigan, 1949)
 Patricia (*Wells*) Eberlein (Michigan State, 1955)
 Herta *Freitag* (Columbia, 1953)
 Betty Jane *Gassner* (NYU, 1957)
 Evelyn *Boyd* Granville (Yale, 1949)
 Susan *Hahn* (NYU, 1957)
 Violet *Hachmeister* Larney (Wisconsin, 1950)
 Anneli *Lax* (NYU, 1955)
 Edith *Luchins* (Oregon, 1957)
 Dorothy *Maharam* Stone (Bryn Mawr, 1940)
 Margaret *Owchar* Marchand (Minnesota, 1950)
 Margaret *Martin* (Minnesota, 1944)
 Cathleen *Morawetz* (NYU, 1951)
 Vivienne *Morley* (Chicago, 1956)
 Vera *Pless* (Northwestern, 1957)
 Joan *Rosenblatt* (North Carolina, 1956)
 Jean *Rubin* (Stanford, 1955)
 Mary Ellen *Estill* Rudin (Texas, 1949)
 Alice *Turner* Schafer (Chicago, 1942)
 Augusta *Schurrer* (Wisconsin, 1952)
 Domina *Spencer* (MIT, 1942)
 Maria *Weber* Steinberg (Cornell, 1949)
 Ruth Rebekka *Struik* (NYU, 1955)
 Jean *Walton* (Pennsylvania, 1948)
 Tilla (*Klotz*) Weinstein (NYU, 1959)
 Margaret *Wilderding* (St. Louis, 1947)
 Joyce *Williams* (Illinois, 1954)
 Marie *Wurster* (Chicago, 1946)

identifies about one-third as researchers, another one-third as teachers, and the final third as scholar-teachers. She describes this last category as "a creative synthesis of the 'female' role of teacher and the 'male' role of research mathematician" (p. 45).

A pervasive theme throughout the book is the effect of marriage and children on the education and careers of the interviewees. Although most of the 1940s Ph.D.'s expected to marry and have children, only ten of the seventeen, less than 60 percent, married; all of the marriages occurred after receipt of the doctorate. On the other hand, seventeen of the nineteen 1950s Ph.D.'s married, fifteen before receipt of the Ph.D. This may account, at least in part, for a longer average time between

receipt of the bachelor's degree and the doctorate for the 1950s Ph.D.'s. Since half of the interviewees were married to academics, anti-nepotism rules and practices at colleges and universities significantly limited the choice of jobs during the early careers of the married women. These prohibitions against the employment of a husband and wife at the same institution, which for the most part remained in effect through the end of the 1960s, were applied mainly to exclude women. An extreme case noted by Murray concerned the termination of the contract of a tenured associate professor when she married an untenured assistant professor. Even without such explicit rules, most women who married academics were expected to put their husbands' careers ahead of their own.

On the other hand, the unmarried women, although employed, did not always fare well. As Murray describes this group: "[T]hey frequently felt greater freedom to travel and to exploit career opportunities, [but] their professional lives were complicated by the fact that their colleagues, and society as a whole, tended to view them as carefree (even irresponsible) individuals who had much more time to take on more work and at the same time required less pay" (p. 152).

Half of the interviewees had children. Many had children at an early age, some before receiving their Ph.D.'s. The decade of the 1950s was one that celebrated the domestic role of women; it was a time when mothers were supposed to stay home, and pregnant women lost their jobs. One of the interviewees was even told that attending class as a student while pregnant would violate state laws. Some of the women were able to return to mathematics after raising children and did so in the 1960s and 1970s when the women's movement opened doors to opportunities that probably did not exist for them at the beginning of their careers simply because of their gender. Others had research careers that were both continuous and productive, although they did not achieve tenured status as early in their careers as comparably situated men would probably have done. Among these are several of the best-known women in the study.

Women Becoming Mathematicians ends with two appendices. The first is a note on oral history; the second is a list of the interviewees, their Ph.D. dates, and some personal information about them. In the first appendix Murray describes the methodology she used to obtain the stories that she has woven into a picture of a group of women who received Ph.D.'s in mathematics in the 1940s and 1950s. However, it is the stories themselves and the insight they give us into the lives of these remarkable women that form the heart of this well-conceived and well-written book and make it a particularly valuable contribution to the growing literature on women in mathematics.