

4-1-2000

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Natasha Keith
Technical High School

Sandra Z. Keith
St. Cloud State University

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Recommended Citation

Keith, Natasha and Keith, Sandra Z. (2000) "Book Review: Women in Mathematics by Claudia Henrion," *Humanistic Mathematics Network Journal*: Iss. 22, Article 10.

Available at: <http://scholarship.claremont.edu/hmnj/vol1/iss22/10>

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Book Review: *Women in Mathematics* by Claudia Henrion

Natasha Keith
Technical High School,
St. Cloud, MN

Sandra Z. Keith
St. Cloud State University
St. Cloud, MN

Women in Mathematics: The Addition of Difference. Claudia Henrion. Indiana University Press, 1997.

NATASHA KEITH'S PERSPECTIVE:

As a high school senior who enjoys mathematics as well as sociology and women's studies, I picked up the book *Women in Mathematics: The Addition of Difference* by Claudia Henrion for my summer reading. The more absolute truth would be that my mother, a mathematics teacher, pushed the book my way. But I was also interested not only because this book appeared more accessible than the dreary statistical literature that I was used to seeing on a family bookshelf, but also because the book discussed a number of stereotypes I recognized and offered case histories of women mathematicians whose appearance in the photographs was intriguing. In other words, this book was humanistic and sociological enough for me to be inviting, and I thought I might even encounter such a book in a women's studies course in the future. Better yet, I might miraculously "find myself," since it has worried me that "UNDECIDED" will be my choice of major on my college application forms.

Each chapter of this book tackles a topic, generally a myth about the role of women in mathematics. Henrion then digests the myth, citing quotations, philosophies, and the case-study accounts of one or two prominent women mathematicians to disprove it, prove it, or prove it partially true. For example, the first chapter, entitled "Rugged Individualism and the Mathematical Marlboro Man" describes the mathematician as explorer, "The image of a mathematician within the mathematics community...is a romantic image of an explorer, living a life filled with adventure, discovery, and excitement." This chapter challenges the idea of mathematicians as "loners," that is, people who work in complete isolation. Here, Karen Uhlenbeck and Marian Pour-El are set as the examples; they describe themselves as loners in long passages of their education, eventually coming to a sense of community in their careers.

The problem for me as a student is that I have never heard of the myth of the mathematician as "Marlboro Man;" I have never thought of the mathematician as the dashing explorer. The book clearly refutes the stereotypes and myths about women mathematicians that are introduced, but this is a somewhat easy task, since, in mathematical vocabulary, any exception to a statement renders it false. But my question about the image of Marlboro man confused me, and made me wonder if the book was really being put forth for readers like me. This kind of confusion persisted through the book, along with more confusion as to whether a stereotype was being broken down or affirmed, found partially true, or side-stepped. In the introduction, the book is described as a study intended to encourage other women to find their own niche in mathematics, to address why women are so under-represented in mathematics, and discover why mathematics still seems to be an isolating field for the most successful women mathematicians. And, while the stories and arguments intrigue me (I discovered mathematicians who were housewives, motherly types, poets, and followers of Zen), I had a nagging feeling that the questions were getting thornier and raising more issues, and that these diverse accounts of women represented a different generation with whom I was not identifying.

With the examples of Karen Uhlenbeck and Marian Pour-El, for instance, I think that the stereotype of the "Marlboro Man" turns into the "Marlboro Woman:" the same individualistic, tough, lonely character, but a woman in the saddle. Uhlenbeck finished high school an independent strong-minded person but with no idea she would do math; she soared in mathematics in college. Marian Pour-El majored in physics at college and ended up as the only woman at Harvard, then worked at Penn while her husband was on the other side of the country. Uhlenbeck says she didn't feel like a mathematician for five years after having her PhD, so strong was her sense of isolation from the mathematics community. (This made me ask what it

should feel like to be a mathematician, and what, exactly, a mathematician is.) In terms of tough personalities and sterling achievements, these women are awesome. They are probably the most brilliant of the brilliant. And as a result I found this chapter somewhat intimidating, because I wondered, should one be a Marlboro woman to do mathematics?

But as the book went on, I also found myself surprised and shocked, to the point of disbelief that the 40's through the 70's could have been a time of such profound and awful discrimination. Every woman in this book had experiences from that period and endured discrimination in some form. The stories of the women seem truthful often to the point of pain: they cover a wide range of experiences, from false starts, loneliness and harassment to brilliant successes. There are cheery anecdotes and triumphs, too. Nevertheless, even as these women overcame the problems unfairly thrown at them and rose to prominence, I am not always comfortable with the ways of living they chose. For example, Fan Chung and her husband have turned a wing of their home into a mathematics world—a library devoted to math books and filled with puzzles for their children, who are cheerfully and intensively coached for math leagues—my personal idea of a nightmare. Marian Pour-El claims she didn't receive any help from anyone, and never fought feminist battles, but on the other hand, might she have benefited from the contributions of other women, who had fought their battles? Mary Ellen Rudin is an admirable example of how motherhood and math do mix, and she assumes an almost mythological saintliness, but only because she is willing to fill the stereotype of 'woman first, mathematician second.' Her point to Judy Roitman is: "If you want to help women in mathematics, do mathematics." This is a sort of Booker T. Washington philosophy (a philosophy that is also discussed in the book), entailing that women should patiently and quietly prove their mathematical abilities, and wait for society's trust and recognition to follow gradually. This is not necessarily the injunction my generation has grown up with.

How do women respond to discrimination? The chapter on women and gender politics provides some answers, but creates questions as well. Perhaps this is because I am (as yet) unfamiliar with an environment of "gender politics," or advocating for women's rights. Henrion plans to break down the stereotype that

"math and politics don't mix." She asks whether mathematics must be defined as a pure field that denies political involvement, and whether mathematics is an "uncorrupted, uninfluenced, un-gender specific field in terms of the subject itself." She then gives examples of women who are involved in mathematics as well as gender politics. But is it that math and politics that don't mix or is it that mathematicians are not political? Has the mathematics itself changed? Is there a feminist mathematics or not?

One can follow a thread in this book about the individualism of these successful women and the ways in which, as outsiders, they strove to become a part of the mathematical community. But it was difficult for me to see how community works when the evidence is given as personal, individualistic anecdotes, and the actual mathematics is not described. I am unfamiliar with a mathematical community. What is it? Metaphors are provided that liken mathematics to a flower, a sea to be explored, a starry sky, but there is no description of the problems and ideas they worked with. As a result, any mention of a mathematical community seemed more for personal and confidence-boosting needs rather than for dealing with the mathematics itself. Many of the women interviewed concurred that being a women in mathematics often made them feel like the "other," because they were seen first as women and secondly as mathematicians whereas males were "mathematicians." It seems that by isolating each woman in her experience, and not discussing the mathematics in the case studies, Henrion is ironically addressing the women as women-first and mathematicians-second. Though it is doubtful that I would have understood a deeper account of the mathematics, such as the achievements of Fan Chung in discrete mathematics or those of Marian Pour-El in logic, I nevertheless desired it, so that I might understand in what ways these women created some kind of dent in the world of mathematics. It is a little like hearing a news flash that a woman chemist has become a Nobel Laureate, without ever knowing what problems in the chemical analysis she was up against, the plan of her research, and how she found her answer. But perhaps it will never be possible to integrate a discussion of women and mathematics at this level.

The chapter "Double Jeopardy and Race" points to some disunity in the mathematical women's community due to race, and deals more with the racial issues

than the gender-related ones. This chapter is in many ways the most engaging and compelling. Examples are provided here of the hard work and the difficulties women overcame; here are stories that are very different from the biographies and conclusions reached earlier. The issues of facing double discrimination, having opportunities denied, the question of attending or teaching at majority black or white schools, and the burdensome sense of having to represent all minority women in mathematics are uniquely analyzed in the cases of Vivienne Malone-Mayes and Fern Hunt.

Finally, in the last chapter, the author completely leaves the subject of women in mathematics to raise the philosophical issue of whether mathematics is based on intuition and ideas or on formality and symbols. She does finally return to the philosophy's effect on women, claiming that women are unable to emphasize the intuitive part of mathematics for fear of being perceived as too feminine. "There is a whole network of associations typically identified with mathematics: rational, objective, a focus on the mind. But this same set of traits is also traditionally identified with men. Moreover, the counterparts of the traits—intuitive, subjective, a focus on the body—are typically identified with women." This seemed to be the most condensed explanation of what Henrion has been investigating all along: why our society has had difficulty admitting women into mathematics, despite their many demonstrations of talent throughout history.

In the end I found myself challenging the challenger, asking: where do the myths themselves come from? Mathematics is a young man's game, math and politics don't mix, mathematics is for white males. A cartoon shows a pregnant woman teacher with the caption, "Somehow she doesn't look like a math professor to me." But what exactly is funny about this? Though Henrion claims that the juxtaposition of roles of a woman and a math professor seems ridiculous enough to be humorous, this stereotype is not in my sphere, and I came away not getting it. This, and other stereotypes that I didn't recognize made me ask: have

some stereotypes subsided because of forceful legal action and criticism of the field of mathematics itself, or is it simply that the times are changing, and the whole country is experiencing new enlightenment? The book states that many women are majoring in math but not following through into graduate school or getting employment. There are a variety of explanations, I think, including that these women may be going into teaching or jobs in computer science and engineering, along with men. But is it that progress in correcting the mathematics community is only just beginning at the lower tiers with the new generation? Judy Roitman says that women are turned off from math mainly in high school, because there's the exclusive subculture of the "math nerds," and women aren't admitted. She also says that women don't like to speak up in class because they want to just "let the men talk" while they sit quietly. But this is not part of my experience at all. In the high school and college classes I have taken, the women not only compose



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the top 5% of grades, they are also the loudest voices and come out with the best ideas. Also, in my high school, most of the top math students are attractive, popular, vocal females, a far cry from the quiet nerd image. But on this account, I can only describe my particular high school.

Certainly the women who are featured here, women who have made it, are a phenomenon. Constantly comparing myself with the biographies of these amazing women was both fascinating and frustrating. Allowing for my personal frustrations, I can also say that reading the book was an adventure into an unexpected world and a fascinating study of character and determination.

By the conclusion of the book, Henrion has explored numerous myths about mathematics. Her delicate treatment and style of writing are simultaneously very warm and analytical. Sometimes the abundance of personal stories makes her generalizations difficult to follow. But the task at hand, of addressing the conflicts within the mathematical community is a formidable one. Hopefully the situation has changed for my generation, but it could probably not improve

without the eye-opening accounting in books such as this one.

SANDRA Z. KEITH (HER MOTHER) RESPONDS

When I gave my daughter Claudia Henrion's book, I had hoped she would find something from a woman's viewpoint to love about mathematics, feel reinforced in the idea that mathematics is not just for men, be exposed to some of the roughness of the mathematics world, read stories from women's mouths, and, lastly, come to identify with some role models who could inspire her a little more in the direction of math major than I have been able to do, since mathematics is a field that interests her peripherally. I have been involved all of my mathematical life in attempts to encourage young girls into mathematics, and my daughter was, I confess, something of a test case. Imagine my consternation, then, in finding that she views these women, many of whom represent my own generation, not so much as role models but as historical relics of a time past, a time preposterous, a time to be pitied but shrugged off! There are two points she makes that require a response: the issue of role models and the issue of discrimination, and the two go hand in hand, as Henrion's book neatly makes clear.

In 1988 (Natasha was 7), I directed a conference on Women in Mathematics and the Sciences. Every single woman there had experienced discrimination—and not just the gender harassment that Henrion and her interviewees describe delicately, but more brutal sexual harassment. As difficult as this topic is to discuss even here and now (one would like to relegate it to *New York Times* magazine supplements such as that of June 13, 1999 instead of polluting mathematics journals) this was something that women of my generation dealt with routinely—and the specter of sexual harassment seemed to haunt the halls of mathematics more than other disciplines, although my evidence on this would be anecdotal. It is somewhat surprising to think that the phrase “sexual harassment,” with which we are only too familiar, was coined only as recently as the mid-70's (by a group of Cornell University women; the first Supreme Court case on sexual harassment, *Meritor Savings Bank v. Vinson*, occurred in 1986). Before sexual harassment was a public phenomenon, you simply “handled it.” Thus office hours, dissertation advising, and friendly chats with the faculty over sherry might not be for you. That my daughter will probably not experience this sort of negating

and isolating experience, that can haunt one for life, is a solid comfort.

However, anyone who thinks discrimination has gone dormant should chat with an Affirmative Action officer; my latest trip to the Affirmative Action Office was a matter of months ago, with a case involving an older student. So how could it be that my daughter finds discrimination exists only now, by reading about it? The only conclusion I can come to that makes any sense, is that when you are 10 or 12 or even 14 or 17, your parents' world is something that doesn't pertain to you. So the education they are passing out now in elementary school is a good thing. Even so, my consternation remains.

Natasha's point about role models, specifically her sensitivity to Henrion's use of the Marlboro Man, recalls a moment of epiphany in my conference. In a session on role models, the speaker was a woman who had successfully been juggling a commute from coast to coast to be with her husband. A woman in the audience spoke up, somewhat aggressively, “How then are you a role model for young girls?” Momentarily we were mute, but it was clear that the point had struck a nerve. Can there be such a thing as too formidable a role model? My conference made abundantly clear that there are organizations that promote healthy youthful role models, but these programs always seem to be budgeted on a string. The millions that may be spent in court rooms over test cases may inspire education on what is politically correct, but women, even of my daughter's generation, will still have a harder time of it, because discrimination breeds and refuses to go away. A month ago a male colleague of mine went to another state to go camping with his adviser to discuss further results to his dissertation. How possible would this have been for me, unless my adviser too, were female? And a class action suit arguing for fairness of salaries is being raised at my university as I write this—I am a poster child for it, having been placed low on the salary scale years ago, and yearly raises determined as percentage increases.

The issue of the Marlboro Man model modulates into the issue of what mathematicians and the mathematics community do, and in this matter I think I agree with Natasha that Henrion's book will require some follow through books. Natasha has completed the first half of calculus at our state university, has had some

minimal experience in Math League practicing and taking challenging tests, and her high school math has been dominated by a method of “problem typologies.” Thus it isn’t surprising that she has had no experience with mathematics as research and discovery. In this learning world, there are no frontiers and no rugged individualists ignoring their neural health as they drive their cattle across mythic continental divides. Even Fan Chung’s math league nursery sounds to her like a nightmare. Natasha asks, “what is this mathematical community?” Natasha would recognize that community as teachers. Henrion largely talks about women who are distinguished by “doing” mathematics, and as a result the book did not reach my daughter

to the extent I’d hoped, because although the women it profiles had challenges and achievements that she could admire as a young woman, the substance of their experience wasn’t hers. In turn, while the book is of enormous significance to me personally and should go into all libraries as an important historical document, it is a pity there isn’t more on mathematics teaching, because teaching is the bridge for young girls.

(Incidentally, the cartoon which my daughter did not find funny was one I suggested for the MAA book, *Winning Women into Mathematics*.)

A Tribute to Ramanujan

*Mahesh Dube
Indore, India*

Amidst the Southern hills
Of an ancient land of myths,
Where Nature has a wild aroma
Komala carried within her
drops of heavenly nectar—
To nourish the blessings of Goddess,
And a mother gifted a blossomed mind
to the mother Earth.
The omniscient scholar of every integer,
Oh! Ramanujan, the mystic and the seer.
To the masters of the field thou became—
the child dearest
Pride and glory of history and
privilege of present.
Moving with an inner light,
Through the labyrinth of numerals
intricate of abstractions were tamed into
Raptures of sweet rhythms!
Charmed and exalted by the music of
numbers and functional oscillations
Dreams cast on thee a spell of
Sums and integrations.

Generously but shyly did thee disclose—
A circle trick and modular stroke.
Didn’t thy Tau-functions provoke
In the pages of Mathematical Society, London
Several congruent relations?
And bring home many conjectures
with Littlewood, Hardy, Watson and Rogers.
From fraternal ecstasy or Mock-Theta agony
Of thy notebook spring
Beacons of our mechanics, cosmology
and super-string.
But alas! the Zenith of thy knowledge
Became the nadir of thy physique,
And from the banks of Cauvery
Across the western horizons
Thou immortal one leaving the fragrance
With Jankee
We bow to thee, oh! Ramanujan—
We bow to thee.