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## A Conversation with Ray Myers

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# A Conversation with Ray Myers

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**Angela N. Patterson**

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New York

Raymond (Ray) H. Myers was born in Charleston, West Virginia, on October 13, 1937. He received a B.S. in chemical engineering from Virginia Polytechnic Institute and State University (Virginia Tech) in 1959, followed by an M.S. and Ph.D. in statistics from Virginia Tech in 1961 and 1963, respectively. In 1962, he became an assistant professor in the Virginia Tech Department of Statistics. Before retiring as professor of statistics in 1995, he had directed the research of 42 Ph.D. students and taught numerous courses in major fields of interest, including experimental design, response surface methodology (RSM), linear models, regression, multivariate analysis, and engineering statistics. In addition, he directed the Statistical Consulting Center for 17 years. Ray has authored or coauthored six books with 17 editions. His refereed journal publications and invited talks number 140 or more. Major honors for Ray include the Shewhart Medal (1995), the Brumbaugh Award (1990, 1999), Virginia Professor of the Year (1985), and the Wine Award for Teaching Excellence, Virginia Tech (1980).

Ray is a Fellow of the American Statistical Association, to which he has dedicated many years of service through editorial positions, committee leadership, and leadership in the local (Virginia) section.

*Angie:* First, Ray, let me say what a treat it is for me to document this “conversation” with someone who has had such a significant influence on my career. I owe a big “thank you” to Quality Engineering and to its editor, Geoff Vining, for giving us this opportunity. When you were growing up, Ray, did you ever imagine that you would have a career in statistics?

*Ray:* Not in my wildest dreams! Certainly not as a child or teenager, no way! A professor? An author of textbooks? Out of the question! I believe I would have put a higher probability of being an actor. I had a higher level of interest!

*Angie:* Tell us about your childhood.

*Ray:* I was a good student but not a superior one. I could have done better. It was important for me to please my parents. My mom was a dominant force. I could easily embarrass her. For example, in the eighth grade, all the students took an aptitude test. She expected that the result would be that I should be a lawyer, doctor, or even an engineer. The result of the test was that I had the aptitude to be a shepherd! I’m not kidding. She was livid! She made sure that none of the neighbors found out! My dad and brother Richard were quite amused. I lived a “Smotherers Brothers” existence. Richard could do no wrong in domestic things like cleaning our room, etc. I never changed. When I grew up, my office at work became legendary!

*Angie:* I know that sports became a big part of your life as an adult, and they were an important component of the lives of your children. Were you active in sports as a child?

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**Ray (5) and his brother Richard (8), a.k.a. the “Smothers Brothers.”**

*Ray:* Yes, though my parents never pushed us into sports. It all happened naturally. My dad did encourage me to hunt and fish as a kid. Result? Disaster! I never could catch a fish and I shot what I thought was a red squirrel and it turned out to be a cute little bird—a Towhee. That was the end of a miserable hunting career. I was quite saddened. I took to basketball very early and soon won some awards in high school. I played some football too, but my best sport was track. I became interested in running in the seventh grade, after finding out that I was the fastest runner in my class. I was on three straight state championship track teams in high school.

I continued to play basketball until I was 48 years old. That year I entered a mile road race and had the fastest time in my age group. Strange feeling... much the same as the feeling I had as a seventh grader! I switched from basketball to running, and running continues to be a very important part of my life today.

As for my children. . . I suppose that my interest in sports did influence them. They were both scholarship athletes in college. Bill was an academic all-American in basketball. Julie swam in college and made the NCAA finals in the backstroke her freshman year. I have been blessed in so many ways with these two.

*Angie:* How did your parents influence your career?

*Ray:* My mom wanted me to be an attorney or an actor. My dad wanted me to be a chemical engineer. I seriously considered all options and decided



**Budding quarterback at 8 years old.**

on chemical engineering at Virginia Tech. I entered in the fall of 1955. Throughout my undergrad I never heard of the field of statistics. I did okay as an undergrad Ch.E. but as time went by I was becoming more and more convinced that I would never serve a day as an engineer. Something was missing.

*Angie:* Dr. Boyd Harshbarger had founded the Virginia Tech Department of Statistics approximately ten years prior to your graduation from the School of Engineering. Did he play a role in your entry into statistics?

*Ray:* Sit tight on this one! I have told this story many times and people laugh in disbelief. To thoroughly understand one must have an understanding of Dr. Harshbarger's ability to convince and also understand the nature of my life and exactly where I was in the spring of 1959. You often hear of the term *Divine Appointment* (a chance meeting that a priori would have occurred with probability zero!). That describes my first meeting with Dr. Harshbarger. I had no job, essentially no money, and no future prospects for either. I was about to attend a spring dance at Virginia Tech and I had found a list of people who would rent rooms to students' dates coming in from out-of-town for dances at the Blacksburg campus. Despite my predicament, I had not a care in the world—merely looking forward to the dance. I looked on the list, searching for a German name and I found the name Harshbarger. I called and reserved a room. When my date arrived on Saturday evening, I took

her to the Harshbarger home and arranged to come by and pick her up in an hour. The plan was to see the sights for awhile and have dinner before going to the dance later that evening. When I arrived at the Harshbarger home about an hour later, she had not even started to get ready. I knew that young lady well and she was never late for anything. Boyd was in the living room, so I went in to introduce myself. He appeared to be from the country and very difficult to understand. He said he was Head of the Department of "Stistics". That is the way he had pronounced statistics his entire life. I said, what is *Stistics*? He said, "No, its Stistics"! I asked, "What is it?" And his description made no sense. He inquired about my academic situation and asked what I was interested in doing. I said, "Right now, I'm interested in going dancing tonight." He offered me a fellowship right there in the living room. This was the most unattractive prospect for my future that I could possibly imagine. I said, "No—I'll try to work out something else." He convinced me to come to his office on the following Monday to talk. I planned not to go but there was something very intriguing about this. It was as if I was in the middle of some kind of rare comedy hour. I could not believe this was serious. He was such an unusual person. (Through the years I grew to not only understand but also love this man, who, unknown to me, was the butt of hundreds of endearing jokes from his colleagues.) Though I had planned not to go see him, I did anyway. When I got there on Monday, he said that the offer was still on the table and I'm not sure why, but I accepted it. I accepted an offer to study in a field I knew nothing about and about which the only description I had heard was incomprehensible. I think perhaps the unknown here made the prospect fascinating. Of course, my mother was not fascinated. When I later told what my plans were, she asked "Statistics? What on earth have you gotten yourself into?"

*Angie:* When did you decide to pursue a Ph.D. in statistics?

*Ray:* I had no plans to pursue a Ph.D. at first. It came gradually as I saw I would be successful and I learned to love it. Of course, it took me a while to learn how to pronounce statistics.

*Angie:* You've won numerous teaching awards during your career. Having been lucky enough to be one of your students, I can't imagine anyone more deserving. When did you realize that you have a passion for teaching?

*Ray:* At first (as a graduate student), I certainly had no desire to teach. That all changed in the fall and winter of 1960 and 1961. I took courses in linear models and multivariate analysis from Dr. Rolf Bargmann, who was the best teacher I had ever had and, I thought, the best teacher in America. He was German, and Boyd Harshbarger had brought him over from Europe (as he did in the case of many outstanding faculty members). I

copied him when I did some substitute teaching later in 1961. I thought, "I can have this kind of fun and get paid for it?" I eventually mastered a blend of his style along with my own that I had developed. He was very unique. In the fall of 1962, Boyd Harshbarger offered me a tenure track position. I truly loved the teaching that I was doing but I was yet to develop any opinion about research.

*Angie:* Describe your early introduction to research.

*Ray:* Dr. Roy Shenton joined the faculty in 1962. He was yet another faculty member brought over from Europe (Britain) by Boyd Harshbarger. He came from Manchester U. and had been a student of M. S. Bartlett. He became my Ph.D. advisor. My Ph.D. research involved estimation problems associated with the negative binomial distribution. I never got excited about this research even though it did help me satisfy the dissertation requirements. I should reveal that within a few years after I completed the degree I lost my dissertation and I spent very little time looking for it. Not long after I finished the Ph.D. I learned about the topic response surface methodology (RSM).

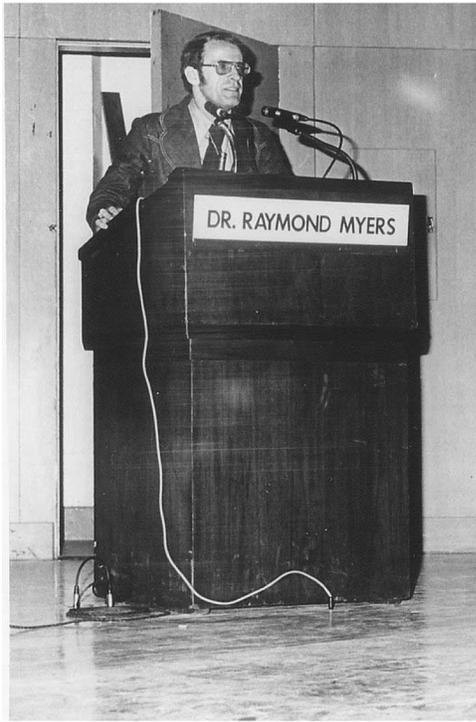
My lack of passion for my Ph.D. topic should not be viewed as any negative reflection on Roy Shenton. I learned a great deal from him about a desirable approach to directing Ph.D. students. Despite the fact that he was well over twice my age, we got along extremely well. We played baseball as well as ping-pong together and a priceless relationship grew. He taught me that the student-professor respect required could easily be maintained with a backdrop of genuine friendship. My wife at the time remarked repeatedly that he was more like a big brother to me.

*Angie:* Very few people receive a tenure track position in a department in which they receive a Ph.D. How did this happen in your case?

*Ray:* Let me answer that with some facts. Boyd Harshbarger was a stickler for keeping rules. We [Virginia Tech Department of Statistics] did then and still do have a rule that states that we don't hire our own Ph.D. products with tenure track positions. Also, the faculty as a unit was a stickler for rules. I also know from "reading between the lines" in conversations that he badly wanted me on the faculty. Also, Boyd rarely took "No" for an answer. I had seen plenty of evidence of that. In addition, unlike the operating procedure after Boyd retired, there were not many ballots taken on anything. Now, you figure it out. On the day the offer was made I went into the office and it was like "no big deal"! The issue never arose in any conversation I was in. Two (senior) faculty members told me years later that they felt at the time of the offer that I should have gone elsewhere but they had since changed their minds.

*Angie:* Tell us about your introduction to response surface methods.

*Ray:* It was 1964 and I had already decided that as soon as I found a research topic and studied and learned about it I would pursue an opportunity



**Ray speaking to the West Point Corps of Cadets, 1973.**

to write a book. Bob Hader from North Carolina State visited the department that summer and taught a course in RSM. He had been in the department with George Box, who had visited Raleigh a few years earlier. I was very taken with what I learned and so I retained a copy of Box and Wilson ('51), Box and Hunter ('57), as well as other papers, and I developed an RSM course. I sought out subject matter applications in journals and after teaching the course a few times, I started writing. That experience was such a joy! I thoroughly enjoyed the next 3–5 years because I also used the book for the teaching of a number of industrial short courses. The little green RSM book was published in 1970, the same year I became a full professor.

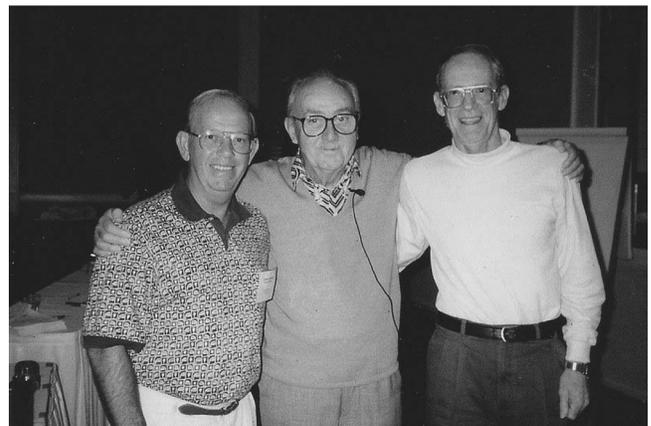
*Angie:* Your “little green RSM book” was highly successful. Many felt as if you would revise it but it never happened. Why not?

*Ray:* I got extremely busy following the writing of the little green book. I was working on three other books during that time. I heard a rumor that Doug Montgomery was considering writing one. Eric Ziegel from AMOCO suggested that we should get together. I had not talked with Doug since he was a student here in the late 60s. So we got in contact and collaborated. I am very happy with the book, which is now in its third edition and with Christine Anderson-Cook as a coauthor. All worked out for the best. Incidentally, it has been a joy working with Doug on that and other projects, including all the short courses we’ve put on together. It has been a great collaboration. He is a great friend and colleague.

*Angie:* You won a Brumbaugh award for your 1999 JQT paper, “Response Surface Methodology: Current Status and Future Directions.” Now that we are 10+ years “into the future,” do you see anything differently?

*Ray:* I really feel that the points made in that paper still apply ten years later. The general goals of RSM remain the same; that is, a collection of strategies in experimental design and analysis for the purpose of process improvement and/or process optimization. What has been added to complement and broaden its usefulness are new developments in analysis for non-normal responses, vis-à-vis generalized linear models, designs for computer experiments, the implementation of split-plot strategy in cases where randomization is not possible, nonparametric modeling, and many others.

I don’t think we can ignore Taguchi’s contribution to RSM. Though I doubt that he knew what RSM means, his ideas surrounding the need to deal with process variance as well as the process mean was picked up by others and initiated the avalanche of dual-RSM that dominated the 1990s. The criticisms of Taguchi by so many were largely justified, but he has been rightly praised because so much good came from his fundamental ideas. It is historically fascinating to me that RSM had reached a kind of “stagnation low” prior to the Taguchi era. Then the interest in mean and variance modeling put new energy into the field. I recall a phone conversation I had with Norman Draper sometime in the mid- to late 1980s. He said, “Ray, we in RSM must stick together, there are not many of us left.” By the mid-90s the literature was filled with new RSM work that at least indirectly was initiated by concepts introduced by Taguchi, particularly those that deal with the concept of noise variables. I recall an experience I had in a short course during the pre-Taguchi period. During a break in the course, a participant



**Ray with George Box and John Cornell at the 2002 Fall Technical Conference.**

came to me and said, “You statisticians spend all your time dealing with the mean model. In my processes I have no trouble with the mean. It is process variance that I worry about because we cannot control the variance in the process stage. What can you teach me?” Well, I fed him some B.S. about quality control methods and some Bartlett and Kendall stuff from 1946, but I could have articulated it much better if I could have anticipated what the future would offer through Taguchi’s contributions. By the way, many were attracted to experimental design because of a curiosity about Taguchi.

*Angie:* How did George Box and Stu Hunter influence your career?

*Ray:* Both George and Stu profoundly influenced my career. With George, it was inspiration through the depths of his ideas. I have an immense respect for George. In the case of Stu, it was his ability as a presenter. At the 1965 JSM, he was speaking on fractional factorials and I thought to myself, “I want to be able to do that” . . . “I can do that.” I worked very hard on conference presentation ideas and techniques.

*Angie:* Earlier you spoke of Doug Montgomery. You taught both Doug and John Cornell at Virginia Tech in the late 60s/early 70s. It seems natural that you would have been their research advisor. Why did that not work out?

*Ray:* I kid them both about that. I have told them that I would have taken them as students if they had told me that they were destined to be rich and famous. Doug approached me with the idea of transferring from IEOR [industrial engineering/

operations research] to statistics and I discouraged it. I felt as if his best plan would be to major in engineering and take as many courses in RSM, design, etc. from the Department of Statistics. He did that and I feel as if it put him on the proper career path. I feel as if he has become the best “professional bridge” between statistics and engineering in the country. He has influenced a large number of students to take similar career paths. If he had gotten into a statistics path without engineering, I don’t believe he would have had the same influence and it would not have affected so many men and women in such a positive way.

As for John, I took a leave of absence from Virginia Tech at the time he would have been working on his dissertation, so it would not have worked out. I do regret not having John as a research student. I had done some work in mixtures prior to the time he came to Virginia Tech. The timing just wasn’t right. As it turned out, both John and Doug have had glorious careers without having had me as their advisor!

*Angie:* I dare say that not too many people can claim to have directed 42 Ph.D. students. If that is not being a shepherd, I don’t know what is! What advice do you have for new assistant professors that may be interested in directing Ph.D. research?

*Ray:* Select good students! Seriously, it is very important to create a partnership in the process. Don’t let your students be strangers. Implement a schedule that contains very regular meetings. Show a sense of optimism to them. Otherwise, do what it takes to maximize the chance that the process will be



Ray is pictured with some of his graduate students, including “adopted” students John Cornell and Doug Montgomery, at a workshop in Ray’s honor, April 2002.

an exciting and productive one for both professor and student.

*Angie:* You have had, and continue to have, an amazing career in statistics. Your accomplishments are so numerous—the teaching and research awards, textbooks, and publications...not to mention having directed 42 Ph.D. students! Are there any of these accomplishments that you enjoyed more than others?

*Ray:* It is difficult to compare them. I have always received a lot of joy learning (or developing) something new and communicating it to others. Actually, this type of joy is present with all of these activities. I really believe though that direction of Ph.D. students gave me the most joy and satisfaction. However, I can't leave the question right there. I badly need to acknowledge the contributions of the 42 students themselves.

I was truly blessed to have had such a wonderful group of students. Each student was unique in his or her own way. In each case, the working relationship resembled that of a partnership, so the research was for the most part a joint effort. Our research sessions together were frequent and fun! The student rarely if ever asked, "When will I finish?" I told them all very early in the process, "We will be near the end when you clearly know, much better than I, what steps need to be taken now." It always amazed me how eloquently the students often recited with great confidence what steps were to be taken next, even if I didn't know myself. The process quite often was transformed into a precious lifelong friendship, and the inspiration generated was seemingly always a long two-way street.

By a small amount, the directing of Ph.D. research was more pleasing and satisfying than classroom teaching. This is even though—and I think you know this Angie—there is a teaching component to both.

It is pleasing that this interview itself brings with it a reminder of experiences brought to me by the 42 graduate students. Geoff Vining, editor of this journal, is one of the 42. He is a source of pride through his current success as a faculty member, administrator, author, and supervisor of graduate students. You, Angie, were of course, another one of the 42. Our research meetings were very special and were punctuated by your enormous enthusiasm about the topic and the process. At the time, Bayesian design seemed difficult, but now, those difficulties turned into great memories. I am sure that the people at GE realize how lucky they are.

*Angie:* Thank you, Ray. It is your students who are truly the lucky ones. We began this conversation talking about your childhood and family. Much has been said about the fact that your two children are active in the statistics profession, as well as your wife Sharon, niece Dawn, and her husband, Tim Robinson. How did that happen?

*Ray:* I really don't know. I pushed the two children into athletics a little bit, but that was not the case with



**Ray and his wife, Sharon, and children, Bill and Julie.**

their profession. I do think that we ought to apply to the *Guinness Book of World Records*, don't you? It has been great to coauthor papers with Sharon and a couple of papers with Bill. In addition, Sharon and I are coauthors, along with Keying Ye, of an engineering statistics book in its ninth edition and translated into seven languages. Tim and I are coauthors (along with Doug Montgomery and Geoff Vining) of a Wiley book in generalized linear models.

*Angie:* One final question, Ray. What would you like to be your legacy?

*Ray:* I hope that any inspiration that was derived from time spent with me can be passed on to others.

## ACKNOWLEDGEMENT

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## ABOUT THE AUTHOR

Angela (Angie) Patterson is a senior technologist at GE Global Research and an adjunct professor in the Virginia Tech Dept. of Statistics. She was privileged to take courses from Ray Myers as a graduate student at Virginia Tech, and to become 39th of the 42 PhD students whose research he directed. She considers Ray a lifelong friend and mentor. Angie is a member of the American Statistical Association (ASA) and the International Statistical Institute.

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