

# **MILTON SOBEL - A PRECIOUS NAME REMAINS EVERLASTING IN MY STATISTICS CAREER**

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## **SYNOPTIC ABSTRACT**

Dr. Milton Sobel, professor emeritus of statistics at the University of California, Santa Barbara, passed away on December 31, 2002 at the age of 83. Dr. Sobel was one of the originators and the pioneers of the ranking and selection methodologies and multiple comparisons in the area of statistical multiple decision theory. As one of his former students, I would like to take this opportunity to remember him with a more personal touch rather than mentioning his esteemed career and scholarly achievements.

Key Words and Phrases: ranking and selection methodologies; multiple comparison; statistical multiple decision theory.

**1**

I first met Professor Milton Sobel in late fall of 1989 when I joined the graduate program in the Department of Statistics and Applied Probability at the University of California, Santa Barbara. During my first three years, I was able to meet him several times, as his office was in the corridor of the department I joined. In the middle of Fall Quarter of 1992, I ran into Dr. Milton in the corridor, as usual. But this time, he asked me whether I was interested in or had ever heard about the statistical decision problems such as multinomial problems or the ranking and selection methodologies. After I answered that I did not know about those, he told me come to his office if I wanted to know more about his questions. Perhaps, this was the first step in what would result in my statistics career.

We usually worked together about twice a week. One moment I vividly remember was when we were discussing a statistical problem that he assigned to me catechistically - in question and answer form. Suddenly, his voice boomed. I was so confused, not knowing at the time that his hearing aid's battery ran out. Since then, the first job I had in the morning when I meet him, was to check his hearing aid battery. If his voice was getting louder, that was a sure sign that his hearing battery was running out.

Sometimes, when we were working, I did not understand his explanations, but he always taught me enthusiastically and very patiently. He was very intellectual and was energetic when teaching. Those lessons as well as the material from our work are lessons I apply now as a professor. To say I owe him a lot, is an understatement.

**2**

One aspect I remember of Dr. Sobel's passion for statistics, when he wanted to write a statement about his enthusiasm for teaching statistics. I helped him to write and to find the answer. After he finished writing, he wanted me to play roles of Administrator and Class in Unison, while he played a role of Retiree. This is part of the skit we did:

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*Retiree to Administrator:* I've been recording my best yearly student for the last ten years and all I ask for is time to find one more student better than any I've found in those ten years.

*Administrator:* It may depend on many things.

*Retiree:* Assume that the quality of students doesn't change and that the quality of my teaching doesn't change either.

*Administrator:* Is there any answer in that case? Isn't there some probability that you will never find a better student?

*Retiree:* You are correct, but I will settle for the usual statistical level of 95% probability that I will find a better student.

*Administrator:* Does it have an answer now? What is it?

*Retiree:* It's a two-sample, nonparametric problem and any of my students can solve it for you.

*Administrator:* It's been a long time since I took statistics. What is the answer?

*Retiree:* If you don't have the skill or the time to work out the answer, my students will do it for you. All you have to do is listen to my students.

*Class in Unison:* He needs 190 years of additional teaching!

*Solution:* The probability of finding a better student for the 1<sup>st</sup> time in the  $j$ -th year is

$$\frac{n}{n+1} \cdot \frac{n+1}{n+2} \cdots \frac{n+j-2}{n+j-1} \cdot \frac{1}{n+j} = \frac{n}{(n+j-1)(n+j)} \quad (j=1,2,\dots)$$

and the probability of finding him within  $N$  years is

$$n \sum_{j=1}^N \left( \frac{1}{n+j-1} \right) \left( \frac{1}{n+j} \right) = n \left( \frac{1}{n} - \frac{1}{N+n} \right) = \frac{N}{N+n}.$$

Setting this equal to  $P^* = 0.95$  with  $n = 10$  gives for  $N$

$$N = n \left( \frac{P^*}{1 - P^*} \right) = 10(19) = 190 \text{ additional years.}$$

*Retirees Comment:* Actually I expect to find between 18 and 19 such excellent students in the period of 190 years and the first one of the 18 or 19 should show up within 10 years. Hence I will settle for 10 years of additional teaching.

### 3

Dr. Sobel and I frequently had at lunch together on campus. He would bring his own food and a bag of cranberries, always generously sharing with me. While having lunch, our conversations often included statistic problems. He used to give me small assignments about statistical problems, as I was a rather curious student and asked for more details. However, our conversations were not limited to statistics; he also shared stories such as how his last name was shortened when his parents immigrated to the United States. Other stories came from when he was a college student - how he was interested in mathematics and statistics at the City College of New York, his graduate study and lectures taken from R.A. Fisher, A. Wald and Wolfowitz at Colombia University. He gave me some of his old notes with his reprints and I still have them to date. He also told of his memorable reminiscences of his co-authors, friends and colleagues, and many wonderful and unique stories he experienced while he made trips to the States, Europe, and other many countries.

I visited his home in Santa Barbara several times. For one of his birthdays, my family and I were invited to his home. He showed me his library, the car garage he had “converted”. But I would call his house his library because every space on first floor including the living room was completely surrounded by bookshelves and books. He also showed us, my family and I, his collections of rare stamps and books. Among them, was

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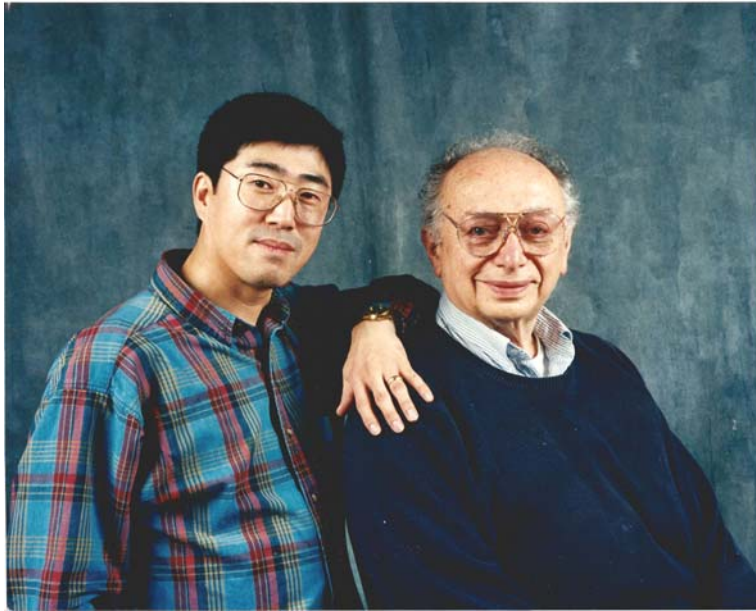
a hand-written mathematics book more than 300 years old. His love for mathematics and statistics could be seen his household. In particular, his collection included many mathematics or statistics related stamps which seemed to be rare and valuable such as Swiss mathematician Euler's stamp and Russian Czar's.

Besides the collecting stamps and books, Dr. Sobel enjoyed playing chess and told me about the chess tournaments at the Santa Barbara Chess Club. He taught me how to play chess. When I finished my Ph.D degree, my family and I went to a department store to buy a leather belt for him, and in the middle of the process with my wife (because of his big belly size), incidentally Dr. Sobel and his wife Florence appeared in front of us. I hugged him to measure his belly.

On November 16<sup>th</sup> 2000, I had an opportunity to invite Milton to give a talk entitled "Exact results for waiting time problems via the Dirichlet," in the Department of Mathematical Sciences at the University of Nevada, Las Vegas. The seminar was about some of his recent developments of a Dirichlet probability generating function and its application to waiting time problems. After the talk, while he and I were having dinner, he offered me homework problems from the Dirichlet Methods, as usual. When I scheduled his trip to Las Vegas, he insisted to use Greyhound Bus from Santa Barbara to Las Vegas and stay low-priced motel to save money from the travel budget. While he may have lived frugally, he was never frugal about his time or his love for statistics and statistics teaching.

## 4

Dr. Sobel was a big man, not just physically, but big in his actions and heart. He was always (and told me) not afraid to be a friend and to seek new problems. The last time I went to visit him was on December 26, 2002 after a phone call from Florence, his wife. He told me he was fine, but I was so sad. I did not have his last assignment. It was five days before he left us forever at the age of 83. Even as he left his family and friends, he will be remembered, and I am thankful for at least the one picture, taken from a Valentine's Day, I have with him, my mentor and colleague. I miss you, Dr. Sobel!



Valentine's Day, February 1994

A few valuable articles that one can feel a breath of Dr. Sobel are listed below for further reading.

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