

# TEACHING of STATISTICS in the HEALTH SCIENCES

## Jodi Lapidus

### From the Section Chair



Happy belated fall to all, and a happy holiday season. I hope that now that most of us are coming to the end of our fall semesters/quarters, we are reflecting on our students' progress and accomplishments. I know that I have been extremely pleased with the MPH students I have had the fortune to teach this year. On the topic of "things I am thankful for"... I am proud that our university enrolled its inaugural cohort of students in the Graduate Certificate in Biostatistics program, and have taken great strides getting our MS in Biostatistics approved. Expansion of our biostatistics education programs, and others around the country, highlights the analytic requirements in many health science professions, and the desirability of biostatistics as a career path.

*I have enjoyed the opportunity to act as Section Chair this year, and look forward to continued responsibilities on the Executive Committee.*

### Newsletter Highlights

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And, all indicators point toward continued growth... so, looks like people like us – those that are interested in, motivated by, or responsible for teaching statistics in the health sciences – will have lots to do! Our student populations will likely become more diverse, especially as we increasingly adopt less conventional teaching methods (e.g. online courses, post-graduate training, etc). I encourage all of us to continue thinking, both in- and outside-the-box, about how we can best serve the student populations that come our way.

I have enjoyed the opportunity to act as Section Chair this year, and look forward to continued responsibilities on the Executive Committee. Next year, the Section Chair position will be held by Motomi Mori, who,

like me, is from Oregon Health & Science University. I know that our section will continue to engage in many interesting activities under her talented, thoughtful leadership. Our 2011 JSM Program Chair, Nichole Carlson is from University of Colorado, Denver. She has already contributed immensely to the JSM 2010

program, and, I am sure, will be responsible for a high-quality program next year. A big, heartfelt thank you to all that have contributed to the section in 2010, especially those on the Executive Committee who, as always, have gone above and beyond, to ensure the section's success.

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Next year, the Section Chair position will be held by Motomi Mori (pictured at left). Welcome to Tomi!

## JSM 2010 - Pictures!



The Vancouver Convention Center, where most of the technical sessions were held.

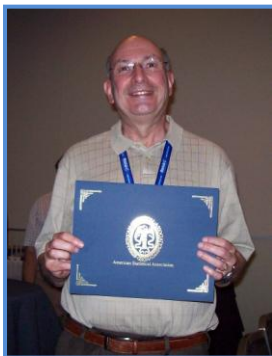


The Convention Center bordered the harbor. We had a nice view from inside, and we could walk outside along the water's edge all the way to Stanley Park, a mile or so away!



These members of the TSHS current and past leadership were available for a picture at the Mixer.

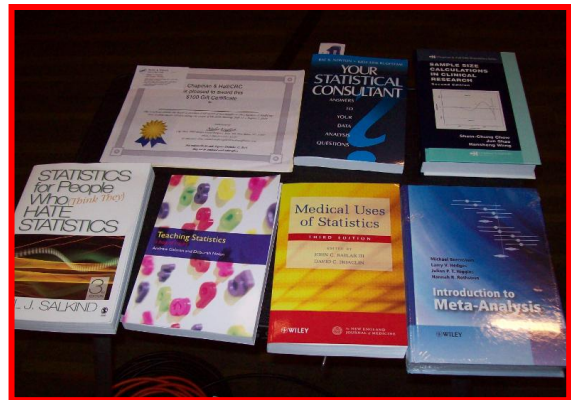
- Ed edits the newsletter.
- Patrick is Past Chair.
- Bob is Publications Officer.
- Carol is Chair Elect-Elect.
- Tomi is Chair Elect.
- Cyndy was Chair a few years ago.



**Left:** Jim Norton, with his award for Best Contributed Paper, "Use of interesting examples in teaching introductory biostatistics: 3 controversies and 2 paradoxes".



**Right:** Patrick Arbogast opening one of the TSHS sponsored sessions.



**BOOK  
REVIEW**

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Robert Alan Greevy, Jr, PhD  
Assistant Professor of Biostatistics  
Vanderbilt University School of Medicine



**Title: Intuitive Biostatistics: A  
Nonmathematical Guide to Statistical  
Thinking [paperback]**

**Author: Harvey Motulsky**

**Publisher: Oxford University Press**

**Year of Publication: 2010 (2nd edition)**

**Number of Pages: 512**

**ISBN-10: 0199730067**

**ISBN-13: 978-0199730063**

**Price: \$54.95 (USA list price)**

Complex fields benefit from stepping stone books. When studying introductory statistics as a health scientist, there are a plethora of introductory textbooks to choose from. Rather, I should say, there are plethora of moderate to advanced introductory statistics textbooks. There are relatively few lower level statistics textbooks that aim at really simplifying the material. *Intuitive Biostatistics: A Nonmathematical Guide to Statistical Thinking* by Harvey Motulsky is one of those few. The book opens with the caveat that it will not make you a statistician. Motulsky writes "The focus is on how to interpret statistical results, rather than how to analyze data." While there many books on how to create statistics, there are few focused on how to consume statistics.

The first section of the book motivates the book and contains three entertaining chapters including a new addition to the second edition. The new chapter illustrates the need for statistics by showing how probability and statistics are *not* intuitive. The substantive material starts in the second section with confidence intervals, a good place to start. It

jumps in very quickly and appears to assume the

reader has some preexisting familiarity with confidence intervals. This would be appropriate for medical doctors and researchers who have already been reading scientific research. Some of the concepts alluded to might not be readily understood by the reader. For example, it explains that confidence intervals only account for sampling variability and not for factors that may limit generalizability to other settings, without introducing or exploring the concept of sampling variability. That said, the following illustrations and examples explain these concepts well. So while the discussion is not always linear, the pieces are there, and the writing is easy to read. I appreciated the discussion of the open debate in interval methods for a proportion and the author's leaning towards what he called the modified Wald interval and others may refer to as the 95% Wilson interval, calculated by adding two successes and two failures to the dataset and calculating the 95% Wald interval on that data. As a whole, the book covers interpretation and basic understanding of the statistical methods one would expect to see introduced in a two semester introductory level course: confidence intervals and p-values, ways of displaying data, one-sample and two-sample tests, noninferiority tests, multiple testing, an introduction to Bayesian inference, and regression based methods including simple linear, multiple, survival, logistic, and proportional hazards.

*Intuitive Biostatistics* presents some mathematics, but intentionally does not present very much. I believe that once students attain a certain level of understanding, the mathematics becomes illuminating. It is hard to imagine deeply understanding statistically methods without understanding the math. *Intuitive Biostatistics* is careful to focus on the goal of achieving a beginner's level of understanding and thus avoid overwhelming the reader. It skips some harder concepts and simplifies explanations. I found that sometimes the simplified explanation is persuasive and easy to understand, but seems, well, too simplified. As an example, consider the argument for using  $n-1$  in the denominator of the sample standard deviation,  $s$ .

The numerator is the sum of the squares of the difference between each value and the mean of those values. Except for the rare case where the sample mean happens to equal the population mean, the data will be closer to the sample mean than it will be to the true population mean (which you can't know). Therefore, the sum of squares will probably be a bit smaller (and can't be larger) than what it would be if you computed the difference between each value and the true population mean. Because the numerator is a bit "too small", the denominator must be made smaller too. ... [If you] compute the SD using  $n$  in the denominator, ... [it will] usually underestimate the SD of the population from which those values were drawn.

This argument correctly asserts that the sum of squared deviations from the sample mean will be less than or equal to the sum of squared deviations from the true mean for any random sample. While that is at the heart of why to use

$n-1$  instead of  $n$ , it lacks clarity without presenting the idea of expectations of statistics. The reader misses that even if taking the deviations from the true mean, the estimator would sometimes overestimate and sometimes underestimate the true standard deviation. The sum of squared deviations is random and the probability that it will be too big is not trivial. That is, whether dividing by  $n$  or  $n-1$ , the sample estimate has a good chance of being larger than the true standard deviation. I imagine most readers would not take "usually underestimate the SD of the population" to mean "underestimate the population SD with a probability greater than a half, a probability that gets continually closer to a half as the sample size increases." The section does provide readers with a beginner's intuition of "Why  $n-1$ ?" and will convince them to use the preferred estimator of the standard deviation. Not explaining that the estimator for the sample variance is an *unbiased estimator* does simplify the discussion and possibly saves some readers from getting overwhelmed. I would not want a student's understanding to end at the discussion in the book, but I would not mind it beginning there.

While there are subtle points the text does not elucidate, there are many important ideas the book explains clearly and often enjoyably. I would not want *Intuitive Biostatistics* to be the last book on statistics a health scientist reads, but I believe it is a useful first book to read. Moreover, for the student whose first foray into statistics left them befuddled and discouraged, this text could be just what they need to get them back on track. While my own courses do require teaching the nuts and bolts of statistical practice, I come across some students who get so lost in the mathematics that they miss the concepts. *Intuitive Biostatistics* is one of the books I will recommend to these students as a way to step away from the more involved math and get the basics.

## *FROM THE PUBLICATIONS OFFICER*

Robert A. Oster, Ph.D., University of Alabama at Birmingham

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### FROM THE PUBLICATIONS OFFICER Contributed by Bob Oster

I enjoyed the 2010 JSM in Vancouver. The speakers were great, the sessions were informative, and the city was a lot of fun. I saw many of you there at TSHS sessions and at other activities. TSHS once again made its presence known. I believe that JSM attendees who are just now learning about TSHS came away with a positive impression of the section. The TSHS-sponsored portions of the JSM, namely the sessions, posters, and coffee roundtables, were top notch and were well attended. I was pleased to see a number of folks interested in our section in general and in our section's activities in particular.

We would like to thank representatives from Wiley, Sage, Oxford and Chapman & Hall/CRC who generously donated books as door prizes for our business meeting and mixer in Vancouver. Prizes given away included:

- *Introduction to Meta-Analysis (Statistics in Practice)*. Michael Borenstein, Larry V. Hedges, Julian P. T. Higgins and Hannah R. Rothstein. Wiley, 2009.
- *Your Statistical Consultant: Answers to Your Data Analysis Questions*. Dr. Rae R. Newton and Dr. Kjell E. (Erik) Rudestam. Sage, 1999.
- *Teaching Statistics: A Bag of Tricks*. Andrew Gelman and Deborah Noland. Oxford University Press, 2002.
- *Statistics for People Who (Think They) Hate Statistics, Third Edition*. Neil J. Salkind. Sage, 2008.
- Chapman & Hall/CRC \$100 gift certificate (courtesy of Nadja English)

I am sure that all of our lucky winners are enjoying their prizes!

Regarding section publications, we had articles published in the March and July issues of *Amstat News*. The first article recognized our 2008 and 2009 Young Investigator Award and Best Paper winners, announced the 2010 awards that were available, and listed the location of our newsletter archive. The second article described our 2010 JSM activities (invited, topic-contributed, and contributed sessions, and coffee roundtables). We intend to have a third article published in the December issue of *Amstat News*. Please be on the lookout for this.

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TSHS will offer a number of awards in 2011. These awards include the Distinguished Achievement Award, the Outstanding Teaching Award, and the Young Investigator Award. You will be receiving more information on these three awards via e-mail announcements from the ASA. A summary of the guidelines for these awards will also appear in the December issue of *Amstat News*. The award announcements are also right here, in this newsletter! See the [Young Investigator Award](#), the [Outstanding Teacher Award](#), and the [Distinguished Achievement Award](#). In addition, TSHS will offer best paper awards for invited, topic-contributed, and contributed sessions, and also for invited and contributed posters.

"TSHS will offer a number of awards in 2011. These awards include the Distinguished Achievement Award, the Outstanding Teaching Award, and the Young Investigator Award." (The award announcements are in this issue of the newsletter. See hyperlinks in the article. Ed)

The Executive Committee continues to work on keeping the TSHS website ([http://www.bio.ri.ccf.org/ASA\\_TSHS](http://www.bio.ri.ccf.org/ASA_TSHS)) as up to date as possible. We occasionally post new links and updated documents there. Please send me ideas for content that you would like to see included on the website as well as ideas for keeping the website up to date.

The ASA has three "modern" ways for members to network with each other and to become engaged in the ASA itself, in addition to the ASA website (<http://www.amstat.org>). These include the ASA Community (<http://community.amstat.org>), which provides an online setting to communicate and collaborate, Twitter (@AmstatNews), where one can follow *Amstat News* and keep up-to-date on the latest information about the profession, and Facebook, where one can become a fan of the ASA to keep up with the latest deadlines, news, and activities. Members can select their favorite method or use all of these for networking and communicating.

Please enjoy the fall and winter seasons. While you are doing this, please make plans to attend JSM 2011 in Miami Beach. The 2011 TSHS Program Chair, Nichole Carlson, is planning an excellent program for us.

I will have another column for you in the spring 2011 issue of this newsletter, so stay tuned!

"Please make plans to attend JSM 2011 in Miami Beach. The 2011 TSHS Program Chair, Nichole Carlson, is planning an excellent program for us."



**CALL FOR PAPERS: THE 2011 ASA SECTION ON TEACHING STATISTICS IN THE HEALTH SCIENCES  
YOUNG INVESTIGATOR AWARD COMPETITION**

Are you or do you know a colleague who is a “young investigator”?

Please encourage “young investigators” (defined as having received a terminal degree no more than 5 years ago and being in a position with rank below Associate Professor and does not hold tenure or its equivalent, or is a current graduate student) to submit papers to the 2011 JSM on Teaching Statistics in the Health Sciences.

Papers submitted should be related to the use of effective methods in statistics education in the health sciences. Papers on teaching in courses, consulting settings, or mentoring sessions are eligible. Review criteria includes the organization and clarity of the paper, the use of innovative or creative methods to effectively teach statistical concepts and methods, and the potential utility by others for teaching statistics in the health sciences.

The “young investigator” must be the first author of an abstract submitted to the TSHS Section for the 2011 JSM.

The recipient will be recognized during the 2011 JSM at the Teaching Statistics in the Health Sciences Business Meeting and Mixer. There is an award certificate and a \$500 cash award.

Application Materials for the Young Investigator Award include:

- Cover letter certifying that applicant meets eligibility criteria (include title and author(s) of abstract submitted to JSM)
- Copy of abstract (include title, but not author(s))
- Philosophy of teaching (no more than 1 single-spaced page; do not include applicant’s name)
- Copy of paper (4-8 single-spaced pages; include title, but not author(s))

Applications are due by email to Jodi Lapidus, Award Committee Chair, Section on Teaching Statistics in the Health Sciences, ([lapidusj@ohsu.edu](mailto:lapidusj@ohsu.edu)) by April 1, 2011. The recipient will be notified in May, 2011.

**CALL FOR NOMINATIONS: THE 2011 ASA SECTION ON TEACHING STATISTICS IN THE HEALTH SCIENCES OUTSTANDING TEACHING AWARD**

Do you know a colleague who is an outstanding teacher of statistics in the health sciences?

Please nominate such outstanding teachers for the 2011 ASA Section on Teaching Statistics in the Health Sciences Outstanding Teaching Award. Self-nominations are welcome.

The recipient will be recognized during the 2011 JSM at the Teaching Statistics in the Health Sciences Business Meeting and Mixer. There is an award certificate and a \$500 cash award.

All nominations must be made with the approval and support of the nominee.

Application Materials for the Outstanding Teaching Award include:

- Cover letter from the nominator indicating that the nominee is an outstanding teacher of statistics in the health sciences
- Copy of the nominee's curriculum vitae
- Statement of the nominee's philosophy of teaching (no more than one single-spaced page)
- Three letters of recommendation submitted by colleagues that are familiar with the teaching abilities of the nominee

Applications are due by email to Jodi Lapidus, Award Committee Chair, Section on Teaching Statistics in the Health Sciences, ([lapidusj@ohsu.edu](mailto:lapidusj@ohsu.edu)) by April 1, 2011. The recipient will be notified in May, 2011.

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**CALL FOR NOMINATIONS:  
THE 2011 ASA SECTION ON TEACHING STATISTICS IN THE HEALTH SCIENCES  
DISTINGUISHED ACHIEVEMENT AWARD**

The Distinguished Achievement Award is presented by the Section on Teaching Statistics in the Health Sciences for outstanding long-term service to the Section. This award is presented every two years.

The recipient will be recognized during the 2011 JSM at the Teaching Statistics in the Health Sciences Business Meeting and Mixer. There is an award certificate and a \$1000 cash award.

To nominate a TSHS member for this award, please send an email that identifies the nominee and describes his or her outstanding long-term service to TSHS to Jodi Lapidus, Award Committee Chair, Section on Teaching Statistics in the Health Sciences ([lapidusj@ohsu.edu](mailto:lapidusj@ohsu.edu)) by April 1, 2011. The recipient will be notified in May 2011.

### Section Officers and Officers-Elect for TSHS (as of Jan 1, 2011)

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### FROM THE EDITOR

Awards, awards, awards! Lots of them in the newsletter. Do you know anybody who deserves one? Nominate him or her! We all enjoyed Vancouver, and I took a lot of pictures! Miami will be much warmer, with lots of hot meetings as well! See you there...

**Ed**

American Statistical Association  
<http://www.amstat.org/>

Section on Teaching Statistics in the Health Sciences  
 Section web page: [http://www.bio.ri.ccf.org/ASA\\_TSHS/html/index.html](http://www.bio.ri.ccf.org/ASA_TSHS/html/index.html)  
 Links to all newsletters: [http://www.bio.ri.ccf.org/ASA\\_TSHS/html/newsletter.htm](http://www.bio.ri.ccf.org/ASA_TSHS/html/newsletter.htm)