6
EDITION

Statistics for People Who (*Think They*) Hate Statistics

Neil J. Salkind

Praise for Statistics for People Who (Think They) Hate Statistics

"Statistics for People Who (Think They) Hate Statistics really makes students learn and enjoy statistics and research in general. Students especially like the Ten Commandments and Internet sites."

—Professor Valarie Janesick

Professor of Educational Leadership

University of South Florida

"I just wanted to say that as a SUNY Delhi online RN-to-BSN student one day into Statistics 101—your book has saved my career! I put off my BSN due to statistics, even enrolling and then backing out a couple of times. I have read the first two chapters and already "get it." I know it will get harder, but I am so thankful for your easy-to-understand method. I told my husband last night I actually might like statistics and enjoy it. I was also thankful for the basic math review. No one ever broke it down like that for me, to the point where I was in remedial math in high school and still never got it. I no longer fear math or statistics."

—Meghan Wheeler, RN

"I truly appreciate your accessibility and help. I am learning to use SPSS in preparation for a doctoral program that will began in the fall and it has been twenty years since I have taken a statistics course. I am thankful for this straightforward book to help me catch up with current trends."

—Sylvia Miller-Martin

"I have loved statistics ever since my second undergraduate course. Your book *Statistics for People Who (Think They) Hate Statistics* has cleared up confusion and partial understandings that I have had for years. It is a must for anyone beginning or continuing their journey in this science. I love it, and will use it for all of the foreseeable future."

—Ronald A. Straube

Mission Texas Regional Medical Center

“Dr. Salkind, I just felt compelled to send you a note thanking you for such a great book —*Statistics for People Who (Think They) Hate Statistics*.

“I bought a house two years ago. The people who lived there previously left the book behind. I didn’t throw it out because I am a book nut.

“Anyway, I have started work on a graduate degree in psychology and decided to pull your book out. This book has been a godsend. It is absolutely the best statistics book I have ever encountered when it comes to explaining things in understandable terms.

“It was well worth the 100K for the house, LOL!”

Bless you!!

Brian Wright

“The project team of Denise, Renee, Shawn, and Trish stated for their research hypothesis that brownies made with regular flour would be preferred to those made with gluten-free flour. The brownie recipe chosen was “The Reward” in Appendix F. Denise made the gluten-free brownies, Renee made the regular brownies, and our sample was our fellow students at Tusculum College. We used an ordinal survey process for rating the brownies on a scale from 1 to 5, with 1 being the worst and 5 being the best brownies you ever had. The gluten-free brownies won, disproving the research hypothesis. The mean and mode were the chosen method of comparison. The gluten-free brownies had a mean/mode of 4, and the regular brownies had a 3. The range for the gluten-free brownies was wider than the range for the regular-flour brownies. All who participated in the survey LOVED the brownies.

“This came about because I asked our instructor if we were going to use the information in Appendix F. Neither my instructor nor my classmates had checked out this particular appendix. The instructor told me I could make the brownies and bring them to class. That is when I told my instructor that I had celiac disease and only had gluten-free flour in my home. Usually gluten-free items are not preferred because of their texture. The instructor had always wanted to try something that was gluten-free, and that was how our in-class experiment was born.”

—Denise Proske

Tesculum College

“I just wanted to take a moment of your time to inform you that I have selected your book, *Statistics for People Who (Think They) Hate Statistics*, to use in my course. I truly agree with the direction you have taken with your book and I know that our students will

appreciate it just the same."

—Karl R. Krawitz, EdD

Baker University, Overland Park, KS

"I am a 'nontraditional' (that's how the nice folks at the University of Dayton refer to 'older') grad student enjoying your *Statistics for People Who (Think They) Hate Statistics*. Although I publicize research in my job, being involved in research and statistics myself is an entirely new challenge. So please count me as one of the countless who appreciate your approach to statistics with a sense of humor—it definitely helps alleviate the intimidation factor of the subject.

"Thanks again for taking on this (and other topics) in such a 'human' way :-)."

Best regards,

Pamela Gregg

Communication Administrator University of Dayton Research Institute

"I just thought I would send a little positive reinforcement your way! As an undergraduate psychology student, I was urged by a friend to purchase your book but not, as you may think, for a stats class. I had taken the required stats class two years prior and had learned NOTHING! As I embarked on my senior honors thesis, I began to feel slightly—maybe more like extremely—overwhelmed by all of the data analysis I was about to undertake. That was when a friend of mine suggested I buy your book. My first reaction? 'I'm not buying another statistics book just for the fun of it!' Well after much prodding, I eventually bought it (the second edition at the time). Now as I take on statistics (multivariate, yikes!) yet again, only this time as a third-year graduate student, I find myself keeping your book alongside as an anxiety-reducing companion!

"Thanks for making statistics bearable for all these years!"

—Ashley Shier, MEd

University of Cincinnati

School of Psychology Doctoral Student

"Hello Dr. Salkind! Just wanted to thank you for putting together a great resource in your *Statistics for People* . . . . I use it to teach my grad course in Quantitative Research Methods in anthropology here at Northern Arizona University. We fondly refer to your book

as ‘Haters.’

“Thanks again.”

Britton L. Shepardson, PhD

Lecturer & Assistant Chair

Department of Anthropology

Northern Arizona University

“Salkind’s examples assist with the application of key concepts and tests. The book is easy to read due to the way information is presented, such as the Tech Talk, Things to Remember, the Key to Difficulty Index, the various 10 lists, the icons, and the illustrations —including the cartoons. Even the title brings laughter to students—and humor can be a great antidote to stress!”

—Mary Beth Zeni

Florida State School of Nursing

“Hi, Mr. Salkind,

“I am a full-time registered nurse of 19 years and have recently begun my journey of obtaining my Bachelor of Science in Nursing. Tomorrow is my first statistics class. I have just read your ‘note to students’ and wanted to write to you and inform you that you have described my symptoms to a T. My classmates and I are extremely anxious about our course and what we are in for over the next 3 months. After reading these two pages, I wanted to tell you that you have alleviated some of my anxiety and allowed me to stop fretting over the unknown and begin to read on. Thank you for that. I am working a night shift tonight; hopefully I will find time to read my required chapters with less anxiety and actually absorb some of the material I am reading. Thank you again; I will try and look forward to learning from your book, my excellent instructor, and my classmates.”

Sincerely,

Lori Vajda, RN

“Vast quantities of statistical information consumed.”

—Beldar from Remulak

"Dear Prof Salkind,

"I just want to thank you for the amazing book, *Statistics for People Who (Think They) Hate Statistics*. I definitely used to be one among them who hated statistics and used to ignore it so far. Now, as I am almost in the finishing stages of my PhD, I was thinking it would be a shame if I don't have a minimum knowledge of statistics. The book has not just helped my understanding in the subject, but it inspires me to do further reading in statistics. I have even recommended the book to a few within 2 days! Thank you so much for such a wonderful work!"

—A. J. Padman

"I just wanted to send a little 'thank you' your way for writing an extremely user-friendly book, *Statistics for People (Who Think) They Hate Statistics*. I'm a psychology major doing an independent study over break (at Alverno, a statistics course is a prerequisite for a class I'm taking this spring, experimental psychology). In other words, I'm pretty much learning this on my own (with a little guidance from my mentor), so I appreciate having a book that presents the material in a simple, sometimes humorous manner. I only suggest writing another textbook at a higher level of statistics so I can read that one too!"

Sincerely,

Jenny Saucerman

"I liked its humorous approach, which indeed helps to reduce statistical anxiety. The design of the book is inviting and relaxing, which is a plus. The writing style is great, and the presentation is appropriate for my students. A fun and well-written book, it is easy to read and use and presents statistics in a user-friendly way. . . . I would recommend it for sure."

—Minjuan Wang

San Diego State University

"Let me thank you for a wonderful textbook. Of all the texts I have used over the years, I would have to rate yours #1 for presenting material that can be followed and understood."

—Carolyn Letsche

MA Student in School Counseling

"Salkind's book is in a class by itself. It is easily the best book of its kind that I have come across. I enthusiastically recommend it for anyone interested in the subject and even (and

especially) for those who aren't!"

—Russ Shafer-Landau

University of Wisconsin

"*Statistics for People Who (Think They) Hate Statistics* is definitely the right book for people who have to overcome that familiar anxious feeling when opening a standard statistics book and who having finally managed to do so are still not able to make much sense of it all. The book by Salkind is easy and pleasant to read and one that hardly needs any pre-knowledge of the field to be able to follow the author's train of thoughts. Salkind has managed to bring statistics home to people who hate statistics or thought they did."

From a review in *Statistical Methods in Medical Research*

(Arnold Publications)

—Dr. Andrea Winkler

Maudsley and Bethlem Hospital

London, UK

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6 Edition

In honor and memory of Shane J. Lopez and welcome to Bella.

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6 Edition

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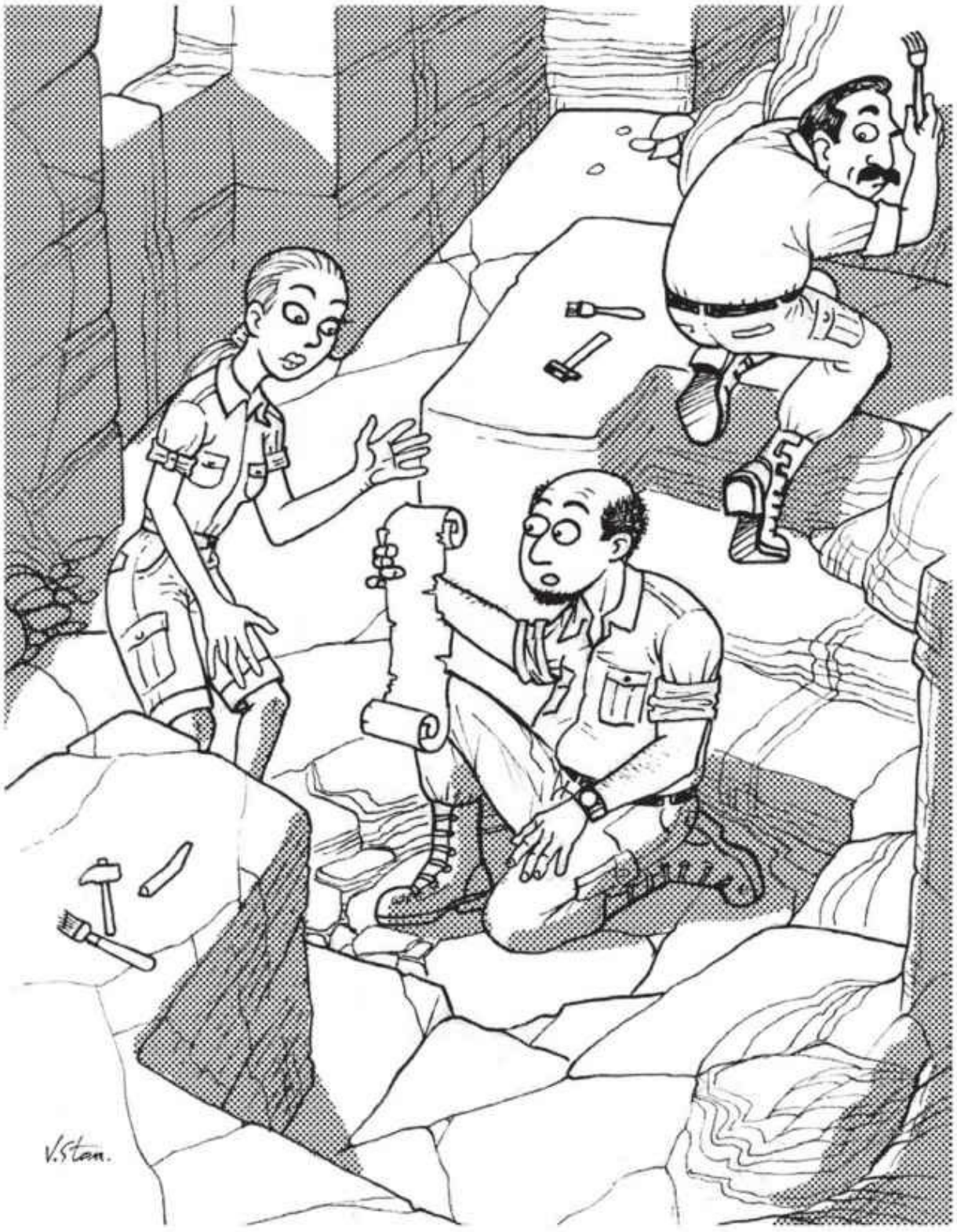

Archeologists dig up the first edition of *Statistics for People Who (Think They) Hate Statistics.*

A Note to the Student: Why I Wrote This Book

With another new edition (now the sixth), I welcome you to what I hope will be, in all ways, a good learning experience. I am overwhelmed by the opportunity to continue to revise this book and the pleasure it brings me and, I hope, brings you.

What many students of introductory statistics (be they new to the subject or just reviewing the material) have in common (at least at the beginning of their studies) is a relatively high level of anxiety, the origin of which is, more often than not, what they've heard from their fellow students. Often, a small part of what they have heard is true—learning statistics takes an investment of time and effort (and there's the occasional monster for a teacher).

But most of what they've heard (and where most of the anxiety comes from)—that statistics is unbearably difficult and confusing—is just not true. Thousands of fear-struck students have succeeded where they thought they would fail. They did it by taking one thing at a time, pacing themselves, seeing illustrations of basic principles as they are applied to real-life settings, and even having some fun along the way. That's what I tried to do in writing the first five editions of *Statistics for People Who (Think They) Hate Statistics*, and I tried even harder in completing this revision.

After a great deal of trial and error, and some successful and many unsuccessful attempts, and a ton of feedback from students and teachers at all levels of education, I have attempted to teach statistics in a way that I (and many of my students) think is unintimidating and informative. I have tried my absolute best to incorporate all of that experience into this book.

What you will learn from this book is the information you need to understand what the field and study of basic statistics is all about. You'll learn about the fundamental ideas and the most commonly used techniques to organize and make sense out of data. There's very little theory (but some), and there are few mathematical proofs or discussions of the rationale for certain mathematical routines.

Why isn't this theory stuff and more in *Statistics for People Who (Think They) Hate Statistics?* Simple. Right now, you don't need it. It's not that I don't think it's important. Rather, at this point and time in your studies, I want to offer you material at a level I think you can understand and learn with some reasonable amount of effort, while at the same time not be scared off from taking additional courses in the future. I (and your professor) want you to succeed.

So, if you are looking for a detailed unraveling of the derivation of the analysis of variance

F ratio, go find another good book from SAGE (I'll be glad to refer you to one). But if you want to learn why and how statistics can work for you, you're in the right place. This book will help you understand the material you read in journal articles, explain what the results of many statistical analyses mean, and teach you how to perform basic statistical tasks.

And, if you want to talk about any aspect of teaching or learning statistics, feel free to contact me. You can do this through my email address at school (njs@ku.edu). Good luck, and let me know how I can improve this book to even better meet the needs of the beginning statistics student. And, if you want the data files that will help you succeed, either go to the Sage website at **edge.sagepub.com/salkind6e**, or contact me via email and let me know the edition you are using.

And a (Little) Note to the Instructor

I would like to share two things.

First, I applaud your efforts at teaching basic statistics. Although this topic may be easier for some students, most find the material very challenging. Your patience and hard work are appreciated by all, and if there is anything I can do to help, please send me a note.

Second, *Statistics for People Who (Think They) Hate Statistics* is not meant to be a dumbed-down book similar to others you may have seen. Nor is the title meant to convey anything other than the fact that many students new to the subject are very anxious about what's to come. This is not an academic or textbook version of a "book for dummies" or anything of the kind. I have made every effort to address students with the respect they deserve, not to patronize them, and to ensure that the material is approachable. How well I did in these regards is up to you, but I want to convey my very clear intent that this book contain the information needed in an introductory course, and even though my approach involves some humor, nothing about my intent is anything other than serious. Thank you.

Acknowledgments

Everybody at SAGE deserves a great deal of thanks for providing me with the support, guidance, and professionalism that takes a mere idea (way back before the first edition) and makes it into a book like the one you are now reading—and then makes it successful. From Johnny Garcia, who heads up the distribution center, to Vanessa Vondressa, who handles financials—this book would not be possible without their hard work.

However, some people have to be thanked individually for their special care and hard work. Helen Salmon, Senior Acquisitions Editor—Research Methods and Statistics, has shepherded this edition, being always available to discuss new ideas and seeing to it that everything got done on time and done well. She is the editor whom every author wants. C. Deborah Laughton, Lisa Cuevas Shaw, and Vicki Knight—all previous editors—helped this book along the way, and to them, I am forever grateful. Others who deserve a special note are Katie Ancheta, associate editor; Chelsea Pearson, editorial assistant; and Libby Larson, production editor supreme. Special, special thanks goes to Paula Fleming for her sharp eye and sound copyediting, which make this material read as well as it does. Libby and Paula are the best in the galactic empire. And special thanks to Dr. Patrick Ament, University of Central Missouri, who, along with his very capable students, took the time to send me detailed feedback about typos, suggestions for changes, and more, making this edition much more accurate and complete than the previous one. Thanks to Patrick and his students.

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And Now, About the Sixth Edition . . .

What you read above about this book reflects my thoughts about why I wrote this book in the first place. But it tells you little about this sixth edition.

Any book is always a work in progress, and this latest edition of *Statistics for People Who (Think They) Hate Statistics* is no exception. Over the past 17 years or so, many people have told me how helpful this book is, and others have told me how they would like it to change and why. In revising this book, I am trying to meet the needs of all audiences. Some things remain the same, and some have indeed changed.

There are always new things worth consideration and different ways to present old themes and ideas. Here's a list of what you'll find that's new in the sixth edition of *Statistics for People Who (Think They) Hate Statistics*.

- Information on levels of measurement has been moved to Chapter 2 from Chapter 6 because it seemed to fit better and many students and faculty thought moving it would be a good idea.
- "Understanding the SPSS Output" is a new section that I've added to Chapters 10 through 17 that I hope provides useful information about IBM® SPSS® Statistics* output and what it means.
- When appropriate, a section on effect size has been added to the coverage of each inferential statistic (starting in Chapter 10). That seems to be an increasingly important topic even at the introductory level.
- A discussion of partial correlation has been included in Chapter 5.
- A new chapter (Chapter 19) has been added as an introduction to data mining using SPSS. It is a mini treatment of this vast topic but at least lets introductory students know that the topic exists and is important to consider in their studies.
- Finally, there are about 20% more additional exercises at the end of each chapter.

This sixth edition features SPSS 23, the latest version that SPSS offers. For the most part, you can use a version of SPSS that is as early as version 11 to do most of the work, and these earlier versions can read the data files created with the later versions. If the reader needs help with SPSS, we offer a mini course in Appendix A, which is also available online.

- Maybe the most interesting (and perhaps coolest) thing about this edition is that it is available as an **interactive ebook**. The interactive ebook version includes a variety of teaching and substantive features, such as links to everything from animated chapter