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***Statistics Unplugged*, Third Edition**
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In memory of Geoff Wood,
whose mom wrote the book on friendship

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About the Author

Sally Caldwell earned her Ph.D. in Sociology from the University of North Texas. The author of *Romantic Deception* (Adams Media, 2000), Caldwell focuses her primary research interest on the topic of deception in social relationships. Caldwell resides in a small village in the hill country of south central Texas and serves on the faculty of the Department of Sociology at Texas State University | San Marcos.

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Preface

The idea behind this book came from my students, after I watched countless semesters unfold in a predictable fashion. The scene repeats itself each year in a classroom largely populated with panic-stricken students facing their first formal encounter with the field of statistical analysis. I like to think that my passion for the subject matter allows me to *connect* with most of the students, but there are always some students who remain locked in the throes of fear. For those students, mere passion on my part won't get the job done. What's called for, I've discovered, is constant attention to the students' perspective—a willingness to respect the roadblocks (real or imaginary) that exist in their minds.

For some students, the roadblock is what I call the *fear of the formula* factor—the tendency to recoil at the mere mention of a mathematical formula. For other students, it's the *so what?* scenario—the tendency for many students to question the relevance of the subject matter and why they have to take the course in the first place. I believe there's a way to overcome these roadblocks, and that's the method I've attempted to present in *Statistics Unplugged*.

For those who are familiar with the second edition, I trust that you'll find the fundamental approach has remained the same in this third edition. I've maintained the emphasis on the *logic* behind statistical analysis and the focus on an *intuitive* understanding that I believe lies within virtually every student. I've also tried to keep the language simple and friendly—something that seems to work for the students.

Changes to the Third Edition

The changes that appear in this third edition fall into three categories. First, I've expanded the introductory material in most chapters. I've also expanded the discussion of some central concepts, largely as a result of student questions about those concepts. Finally, I've sprinkled in a few additional examples in an effort to increase student understanding of the material.

As an example of the first sort of modification, I've included a *Before We Begin* section as a prelude to most of the chapters. The *Before We Begin* sections have been designed to accomplish two things in your trek through the book: 1) Give you some perspective of where you have been; and 2) get you prepared for where you're going. Some are longer than others, but all are intended to set the stage for new material. I urge you to take the sections to heart.

As an example of the second sort of modification, the material regarding measures of variability or dispersion is a case in point. For example, the discussion of the standard deviation has been expanded significantly, largely in response to student questions.

As to the third sort of change, I'm a firm believer in the notion that repetition is an important ingredient in the learning process; thus I've included some new examples of concepts and calculations. It's difficult to imagine that examples can hinder the learning process, so I trust the new examples represent a positive addition.

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Acknowledgments

Books never *just happen*. They take time and effort. And they usually require the contributions of a lot of people along the way. The third edition of *Unplugged* isn't any different. The changes that have found their way into this edition came from many sources, including different corners within the Cengage organization and a number of universities.

When it came to getting everything moving along on the right track, it was my editor, Jane Potter, whose direction helped me navigate the sometimes complicated revision process. Jane was patient, understanding, encouraging, and responsive. Moreover, she brought a critical mind to the project. Her assistance was invaluable. The same can be said about Vernon Boes who was in charge of art direction on the project.

As to contributions from the halls of academe, I'm extremely indebted to the reviewers who were willing to review painstakingly the second edition of *Unplugged* and make suggestions for revisions. Accordingly, my sincere appreciation is extended to the following: David J. Hard (Loyola Marymount University); Heather Gelhorn (University of Colorado, Boulder); Andrew Garner (University of Mississippi); Allan R. Barnes (University of Alaska, Anchorage); and Colleen Swain (University of Florida). Those individuals join a long list of others who made similar contributions to previous editions. By now, I think of this book as a truly collaboration, group effort, and those earlier contributions deserve recognition.

In the first edition, those reviewers were:

James Knapp, Southeastern Oklahoma State University
Paul Ansfield, University of Wisconsin, Oshkosh
Lora Schlewitt-Haynes, University of Northern Colorado
Ida Mirzaie, Ohio State University
Charles Harrington, University of Southern Indiana
Steve Weinert, Cuyamaca Community College

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J. Oliver Williams, North Carolina State University
Holly Straub, University of South Dakota
Faye Plascak-Craig, Marian College
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Susan Nolan, Seton Hall University

For the second edition I am most appreciative for the help from

Robert Abbey, Troy University
David Hardy, Loyola Marymount University, Los Angeles
Steven Scher, Eastern Illinois University
Allen Shoemaker, Calvin College
Beverley Whalen-Schmeller, Tennessee State University

For the third edition I would like to thank

David J. Hardy, Loyola Marymount University
Heather Gelhorn, University of Colorado, Boulder
Colleen Swain, University of Florida
Andrew Garner, University of Mississippi
Allan R. Barnes, University of Alaska, Anchorage

Within the halls of my institution there were several individuals who were willing to listen to my incessant requests to discuss various statistical concepts. Moreover, they were willing to offer suggestions as to how *Unplugged* might be improved. At the top of the list is Professor Kay Newling—someone who shares my passion for the field of statistics and someone who can always be counted on to offer a refreshing perspective. I also owe a debt of gratitude to Ms. Michelle Edwards and Mr. Francisco Carrejo—graduate students who were invaluable in this effort. Ms. Edwards, in her role as a statistics lab instructor, developed a true connection with the students. That, coupled with her superb communication skills, meant that I was in the position to constantly monitor how the book material was being received by students. As for Mr. Carrejo, his assistance in grading, organizing my classes, and organizing me, for that matter, made my life far less complicated. Mr. Carrejo also went beyond the call of duty in his willingness to listen to me muse out loud about this or that statistical concept.

And then there's that cadre of very special people who make my life a joy. They make me laugh; they give my life purpose; they keep me sane. And in that category there is Eric Groves, a very significant character in my life's journey. Eric is willing to tolerate almost any of my eccentricities, unless, of course, it's something that gets in the way of a football game. Then there are the likes of Susan Abughazaleh, John Friedli, and Steve Klepfer, friends from far and near. The mere thought of any one of them brightens my day. To be with them is pure pleasure. They are clever, witty, engaging people. And finally, there are my pals, Marilee Wood and Tevis Grinstead. I never quite know what to say about them. I lack the words to describe their generosity, just as I can't begin to express what their friendship has meant to me. When I think about Marilee and Tevis, I know I am blessed.

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Introduction

Methods, Material, and Moments to Remember

Statistics, Quantitative Methods, Statistical Analysis—words, phrases, and course titles that can shake the confidence of nearly any student. Let me put your mind at ease right away. Your experience with statistics doesn't have to be a horror story. In fact, your experience with statistics can be an enjoyable one—a venture into a new way of thinking and looking at the world. It's all a matter of how you approach the material.

Having taught statistics to legions of undergraduate students, I've spent a lot of time trying to understand how students react to the material and why they react the way they do. In the process, I've developed my own approach to the subject matter, and that's what I've tried to lay out in this book. As we get started, let me tell you a little more about what to expect as you work your way through this book.

First, let me explain my method. I'm committed to the idea that the subject matter of statistics can be made understandable, but I'm also convinced that it takes a method based on *repetition*. Important ideas and concepts can be introduced, but they have to be reintroduced and reemphasized if a student is to get the connection between one concept and the next. Repetition—that's the method I've used in this book, so you should be prepared for that.

At times you may wonder why you're rereading material that was emphasized at an earlier point. Indeed, you'll likely start muttering "not that again!" If that happens, enjoy the moment. It signals that you're beginning to develop a sense of familiarity with the central concepts.

I've also tried to incorporate *simplicity* into the method—particularly in the examples I've used. Some examples will probably strike you as extremely simplistic—particularly the examples that are based on just a few cases and the ones that involve numbers with small values. I trust that simplistic examples won't offend you. The goal here is to cement a learning process, not to master complicated mathematical operations.

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