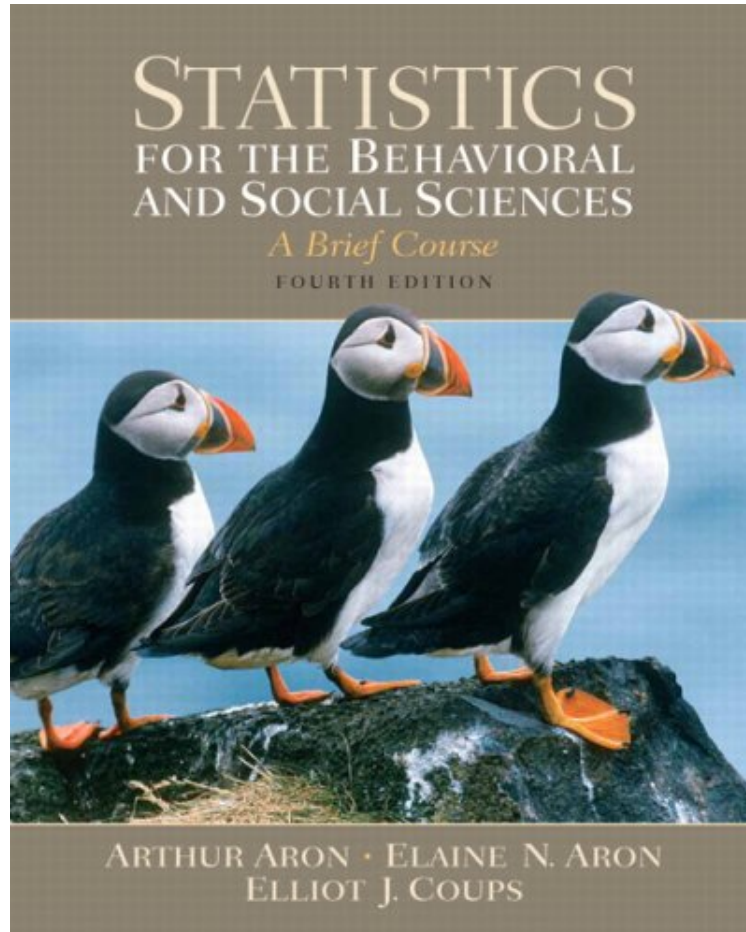


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## Statistics for the Behavioral and Social Sciences (4th Edition)

Arthur Aron, Elaine N. Aron, Elliot Coups  
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### Arthur Aron, Elaine N. Aron, Elliot Coups : Statistics for the Behavioral and Social Sciences (4th Edition)

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For one-quarter/semester courses that focus on the basics or combine statistics with research methods. By using definitional formulas to emphasize the concepts of statistics, rather than rote memorization, students work problems in

a way that keeps them constantly aware of the underlying logic of what they are doing. Here, in the fourth edition of *Statistics for the Behavioral and Social Sciences*, the authors have refined their text by building off an already well-established approach - emphasizing the intuitive, deemphasizing the mathematical, and explaining everything in direct, simple language - but also going beyond these principles to both further student understanding and stimulate the long-suffering community of statistics instructors. By using definitional formulas to emphasize the concepts of statistics, rather than rote memorization, students work problems in a way that keeps them constantly aware of the underlying logic of what they are doing.

From the Publisher Because today statistics are done by computer, not by hand, and the majority of social science majors are human- and word-oriented, not math and number oriented, this text offers a different approach to teaching statistics. Focusing on understanding, it emphasizes the intuitive, de-emphasizes the mathematical, explains everything in clear, simple language, and requires students to put what they know into words rather than to recite formulas. From the Back Cover Focusing on understanding, it emphasizes the intuitive, de-emphasizes the mathematical, explains everything in clear, simple language, and requires reader to put what they know into words rather than to recite formulas. Emphasizes statistical methods as used in research in a wide range of social science fields e.g., education, sociology, communication, political science, anthropology, psychology, business. Excerpt. Reprinted by permission. All rights reserved.

TO THE INSTRUCTOR The heart of this book was written over a summer in a small apartment near the Place Saint Ferdinand, having been outlined in nearby cafes and on walks in the Bois de Boulogne. It is based on our 40 years of experience teaching, researching, and writing. We believe that this book is as different from the conventional lot of statistics books as Paris is from Calcutta, yet still comfortable and stimulating to the long-suffering community of statistics instructors. The approach embodied in this text has been developed during our combined 40 years of successful teaching successful not only in the sense that students have consistently rated the course (a statistics course, remember) as a highlight of their undergraduate years, but also in the sense that students come back to us later saying, "I was light-years ahead of my fellow graduate students because of your course," or "Even though I don't do research, your course has really helped me understand statistics that I read about in my field." In this third edition of this Brief Course we have tried to maintain those things about the book that have been especially appreciated, while reworking the text to take into account the feedback we have received, our own experiences, and advances and changes in the field. We have also added new pedagogical features to make the book even more accessible for students. However, before turning to the third edition, we want to reiterate some comments we made in the first edition about how this book from the beginning has been quite different from other statistics texts.

WHAT WE HAVE DONE DIFFERENTLY We continue to do what the best of the newer books are already doing well: emphasizing the intuitive, deemphasizing the mathematical, and explaining everything in direct, simple language. But what we have done differs from these other books in 10 key respects.

1. The definitional formulas are brought to center stage because they provide a concise symbolic summary of the logic of each particular procedure. All our explanations, examples, practice problems, and test bank items are based on these definitional formulas. (The amount of data to be processed in our practice problems and test items are reduced appropriately to keep computations manageable.) Why this approach? To date, statistics texts have failed to adjust to technologic reality. What is important is not that the students learn to calculate a correlation coefficient with a large data set computers can do that for them. What is important is that students work problems in a way that they remain constantly aware of the underlying logic of what they are doing. Consider the population variance the average of the squared deviations from the mean. This concept is immediately clear from the definitional formula (once the student is used to the symbols) Teaching computational formulas today is an anachronism. Researchers do their statistics on computers now. At the same time, the use of statistical software makes the understanding of the basic principles, as they are symbolically expressed in the definitional formula, more important than ever. Students still need to work lots of problems by hand to learn the material. But they need to work them using the definitional formulas that reinforce the concepts, not using the computational formulas that obscure them. Those formulas once made some sense as time-savers for researchers who had to work with large data sets by hand, but they were always poor teaching tools. (Because some instructors may feel naked without them, we still provide the computational formulas, usually in a brief footnote, at the point in the chapter where they would traditionally have been introduced.)
2. Each procedure is taught both verbally and numerically and usually visually as well. In fact, when we introduce every formula, it has attached to it a concise statement of the formula in words. Typically, each example lays out the procedures in worked-out formulas, in words (often with a list of steps), and illustrated with an easy-to-grasp figure. Practice exercises and test bank items, in turn, require the student to calculate results, write a short explanation in layperson's language of what they have done, and make a sketch (for example, of the distributions involved in a t test). The chapter material completely prepares the student for these kinds of practice problems and test questions. It is our repeated experience that these different ways of expressing an idea are crucial for permanently establishing a concept in a student's mind. Many students in the social and behavioral sciences are more at ease with words than with numbers. In fact, some have a positive fear of all mathematics. Writing the formula in words and providing the lay-language explanation gives them an opportunity to

do what they do best. 3. A main goal of any introductory statistics course in the social and behavioral sciences is to prepare students to read research articles. The way a procedure such as a t test or chi-square is described in a research article is often quite different from what the student expects from the standard textbook discussions. Therefore, as this book teaches a statistical method, it also gives examples of how that method is reported in journal articles. And we don't just leave it there. The practice problems and test bank items also include excerpts from journal articles for the student to explain. 4. The book is unusually up-to-date. For some reason, most introductory statistics textbooks read as if they were written in the 1950s. The basics are still the basics, but statisticians and researchers think far more subtly about those basics now. Today, the basics are undergirded by a new appreciation of issues like effect size, power, the accumulation of results through meta-analysis, the critical role of models, and a whole host of new orientations arising from the central role of the computer in statistical analyses. We are much engaged in the latest developments in statistical theory and application, and this book reflects that engagement. For example, we devote an entire early chapter to effect size and power and then return to these topics as we teach each technique. Furthermore, we discuss how to handle situations in which assumptions are violated, and we cover data transformations (this widely used approach is easily accessible to introductory students but is rarely mentioned in current introductory texts). 5. We capitalize on the students' motivations. We do this in two ways. First, our examples, while attempting to represent the diversity of social and behavioral science research, emphasize topics or populations that students seem to find most interesting. The very first example is from a real study in which 151 students in their first week of an introductory statistics class rate how much stress they feel they are under. Also, our examples continually emphasize the usefulness of statistical methods and ideas as tools in the research process, never allowing students to feel that what they are learning is theory for the sake of theory. Second, we have worked to make the book extremely straightforward and systematic in its explanation of basic concepts so that students can have frequent "aha!" experiences. Such experiences bolster self-confidence and motivate further learning. It is quite inspiring to us to see even fairly modest students glow from having mastered some concept like negative correlation or the distinction between failing to reject the null hypothesis and supporting the null hypothesis. At the same time, we do not constantly remind them how greatly oversimplified we have made things, as some books do. 6. We emphasize statistical methods as a living, growing field of research. Each chapter includes one or more "boxes" about famous statisticians or interesting side-lights. The goal is for students to see statistical methods as human efforts to make sense out of the jumble of numbers generated by a research study; to see that statistics are not "given" by nature, not infallible, not perfect descriptions of the events they try to describe but rather constitute a language that is constantly improving through the careful thought of those who use it. We hope that this orientation will help them maintain a questioning, alert attitude as students and later as professionals. 7. The final chapter looks at advanced procedures without actually teaching them in detail. It explains in simple terms how to make sense out of these statistics when they are encountered in research articles. Most research articles today use methods such as analysis of covariance, multivariate analysis of variance, hierarchical multiple regression, factor analysis, or structural equation modeling. Students completing the ordinary introductory statistics course are ill-equipped to comprehend most of the articles they must read to prepare a paper or study a course topic in further depth. This chapter makes use of the basics that students have just learned (along with extensive excerpts from current research articles) to give a rudimentary understanding of these advanced procedures. This chapter also serves as a reference guide that students can keep and use in the future when reading such articles. 8. The accompanying Student's Study Guide and Computer Workbook focuses on mastering concepts and also includes instructions and examples for working problems using a computer. Most study guides focus on plugging numbers into formulas and memorizing rules (which is consistent with the emphasis of the textbooks they accompany). For each chapter, our Student's Study Guide and Computer Workbook provides learning objectives, a detailed chapter outline, the chapter's formulas (with all symbols defined), and summaries of steps of con...