

社会学精品原版教材系列

# Social Statistics

Fourth Edition

A Text Using MicroCase®

## 社会统计学

应用MicroCase®软件的课本

William Fox (美) 著

外语教学与研究出版社  
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## 社会统计学

William Fox (美) 著

郭志刚 导读

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# 总 序

中国是一个有着几千年文明史的国家，中国人在哲学、历史、伦理、文学、天文、算学、医学等领域的研究都有悠久的历史，形成了自己独特的学术传统。但是到了近代却在对自然界和人类社会的研究方面长期闭关自守，裹足不前，最后古老的中国终于败在西方国家的“坚船利炮”之下。

被一连串失败震动了的中国人，开始仿照西方国家开办新式学校，讲授西方的各种学科知识。发源于西方社会的自然科学、社会科学、人文科学、医学、工程学等开始进入中国学校的讲堂。这些变化使中国进入了一个新的时代，与世界接轨的时代，改变了中国的教育体系，改变了中国人的知识结构，也改变了中国人的思想观念。

进入21世纪之后，世界各国之间依然存在激烈的竞争。对于中国来说，与西方发达国家竞争的激烈程度丝毫不逊于近代史上的任何时期。当年落后的中国败于“鸦片战争”，败于“甲午海战”，当年内部分裂的中国在日寇进攻下一度失去了半壁江山，面临民族存亡的危机。中华人民共和国的建立使得中国人团结起来了，在政治上站起来了，但是必须承认，我们在科学技术、社会科学、经济建设等不少方面仍然远远落在西方发达国家的后面。

要想让中国人真正站起来，就必须使中国人在科技、教育等各个方面赶上西方发达国家。也正是在这样的形势下，党中央提出了“科教兴国”的策略。一个国家如果没有真正先进的教育，就不可能有高素质的国民，不可能产生先进的科学技术，不可能发展强大的经济。当代社会财富的增值主要来自技术的创新，而技术的创新来自基础科学的创新，基础科学的创新人才又来自我们的学校教育。一个真正强大的国家，不仅要有先进的自然科学与工程技术，也必须发展出先进的人文学科和社会科学。人是社会的动物，不把社会的基本结构、组织形式、运行机制研究清楚，不培养和造就高素质的国民，我们怎么去组织和管理这个社会包括它的经济活动呢？

社会学是起源于西方的一门社会科学，研究的是在社会形态下的人如何思想和行动，最早被严复翻译成“群学”，因为它研究的不是作为生物体的人，而是生活在社会之中并与其他人保持密切交往的人。社会学一方面教给人们如何去理解社会变化的规

律，学习认识社会的研究方法，另一方面也在教导人应当如何在社会中生活，应当如何做人。中国的文化传统对这两点是很强调的，儒家首先讲的就是“修身齐家”，然后才是“治国平天下”。中国有自己的文化传统，这是几千年发展出来的一个知识体系，这个知识体系中凡是好的东西，仍然要继承下去，比如中国的“和而不同”的思想，对于不同文化之间、不同民族之间的交流与共处，就是很有价值的思路。中国人在几千年里的族群交流、文明碰撞中能够发展出今天这样一个地域辽阔、族群繁多、文化多元的国家，形成了一个“多元一体”的中华民族，是有它的道理的，根就在我们的文化传统中。

在现代化进程当中的中国必须与其他各国打交道，与各国做生意，所以必须了解西方社会和它们的文化传统、思想观念和学术体系，需要了解它们的社会研究方法与理论，了解它们的社会学这门学科的系统性知识。可惜的是，建国后这个学科曾经一度被取消，随着70年代后期“改革开放”方针的确立，党中央又决定在我国重建社会学。20多年过去了，应当说我们在恢复这个学科的教学和研究工作方面，做出了不少成绩，使得这个一度被社会遗忘的学科，再次有了一定的知名度。但是要看到这个学科仍然不够成熟，各个学校的发展也不平衡，在许多方面还需要断续“补课”，需要培养一批高素质的教师，需要编写高质量的教材，同时需要组织一批密切结合我国社会变迁发展的研究课题，组织出版相应的研究成果。

要想使中国的社会学发展起来，在开始阶段要做两件事：一是继续学习和了解西方国家社会学的最新研究方法与研究成果；二是脚踏实地地在中国做实地调查研究、了解国情、分析各种社会学理论对于中国社会的适用性，研究中国社会的发展规律。做好了这两件基础性的工作，我们就有可能借鉴国外的知识，研究中国社会的实际现象，在分析中努力提出具有创新性的命题与理论，再经过跨国比较研究，使这些从中国社会提炼出来的知识变成世界知识体系的组成部分。

近年来，我们注意到西方国家的知识和技术的发展与更新速度在不断加快，这使得我们学习与研究的速度也不得不加快。以自然科学为例，现在世界上最新的前沿命题与研究成果都及时刊登在英文的学术期刊上。只有在大学本科期间就使用国外英文版教科书来学习基础物理、基础化学、基础生物学等课程的学生，才可能通过学习来熟练地掌握相关的英文术语和表达方式，也才有可能在研究生阶段比较熟练地阅读这些学科的英文期刊，在研究生毕业后才有可能迅速接近世界学术前沿。也正是看到了这一点，教育部在积极推动我国大学课程的英语授课。

在使用英文教科书方面，我国文科的紧迫性也许不如自然科学，但是同样也需要提到日程上来。前几年为了补充国内教材的不足，我们与华夏出版社合作，组织翻译了《高校经典教材译丛——社会学》，已先后出版了十几本翻译版的国外教材，总的来说反响是好的。现在外语教学与研究出版社（外研社）愿意组织出版一批英文原版的社会学教科书，这同样是一件好事。如果我国有一些本科生或研究生能够通过阅读这些英文原版教材来学习社会学，这无疑为他们阅读英文社会学杂志搭了一座桥，我想这对于社会学这个学科的建设与对外交流是非常有益的。

这样来看，社会学这个学科未来的教材可以包括以下四个部分：一是国内学者创造性的著述，二是国内学者借鉴西方知识体系同时结合我国国情研究撰写的系统教材，三是翻译成中文的西方教科书，四是英文原版教科书。在本科生学习期间，以第一部分为主，后三部分为辅。到了本科高年级和研究生学习期间，再进一步增加对中文和英文的研究专著、学术期刊的阅读。这样中西结合，互相补充，取其精华，去其糟粕，既有助于学生拓展视野、丰富知识，又可以促进比较分析，提高学生独立判断与思考的能力。这对于中国社会学的教学与研究工作的，对于中国社会学的对外交流，必将有所促进。我国派到美国和欧洲去留学的学生，在国外的大学里主要也是在读这些书，如果我们大学里的图书馆能够订购到系统和丰富的英文教科书和学术期刊，就可以至少在阅读材料方面为我们的学生们提供一个较好的条件。

当然，在历史上中国有自己的发展道路与传统文化，在今天的现代化进程中中国也有自己的政策与国情，西方的社会学理论与观点是否符合中国社会的实际，需要检验才可以证实。我们在阅读原版教材时，也必须以辩证的眼光去分析和辨别。但我们在21世纪的今天，必须放眼世界，无论在自然科学还是在社会科学的知识发展方面都必须做到“知己知彼”，了解国外的社会学理论与研究成果，也就是了解其他国家是在以什么样的思路来分析和理解中国。

21世纪决不会是一个平静的世纪，全球化是一个不可抗拒的发展大势，它增进了不同国家、不同文化之间的接触与交流，同时在国家利益的相互碰撞中，在不同文化的相互碰撞中也隐藏着矛盾与冲突，甚至会出现局部的战争。我们需要了解我们中华民族的文化传统与发展历史，也需要了解其他国家的文化传统、社会制度、价值观念和行为规范，逐步在中外社会、中外社会学思想的比较中更加深刻地认识自身与他人，真正做到中国人的文化自觉。我想这应当是中国社会学者不可推卸的历史责任。在这个过程中，我们必须开拓眼界，虚怀若谷，既不固步自封，也不妄

自菲薄，脚踏实地把我们的教学与研究做好，使社会学为今后中国社会的发展做出它不可替代的贡献。

我们盼望着由外研社出版的“社会学精品原版教材系列”早日与广大读者见面，以推动我国的社会学教育与研究有更进一步的发展。

A handwritten signature in black ink, which appears to be '费孝通' (Fei Xiaotong), written in a cursive style.

（费孝通）

2003年6月20日

## About the Author

William Fox has a B.A. in Political Science from the University of Michigan and a Ph.D. in Sociology from Indiana University. He has taught at the University of Iowa, Florida Atlantic University, and Richmond College in London, and is now Professor of Sociology at Skidmore College in upstate New York. His current research interests are in urban folklore and social history. Bill lives with his wife, Collette, in an empty Victorian nest in Saratoga Springs, New York, where he enjoys biographies, Mozart, and roots music.



# Preface

This fourth edition of *Social Statistics* is prompted by the generous reception given previous editions and is guided by their users' comments and suggestions. Students and faculty alike have forwarded their ideas for conveying statistical ideas more effectively and efficiently. I have tried my best to incorporate the sense and substance of their suggestions in this edition. This edition uses updated and expanded data sets and incorporates a new version of the MicroCase software. I have again integrated data management techniques into statistical analysis and offered examples of statistical write-ups. Students welcomed the supportive, interactive style of earlier editions, and I have continued the same in this edition.

## MicroCase

This text uses a student version of MicroCase, a straightforward, no-nonsense piece of statistics software. MicroCase does data analysis and gets the job done efficiently, competently, and intelligently. You will learn statistics, and substantive social science too, with minimal distraction from the computer itself. No inundation with esoteric options. Just learning statistics (or whatever). Just doing data analysis. I have written this text in the same pragmatic spirit as MicroCase.

You will like MicroCase a lot. It can do just about any sort of statistical analysis that you are ever likely to want to carry out. Here are some of the things that MicroCase can do:

- Compute percentages.
- Produce statistical tables.
- Produce pie charts and bar graphs.
- Draw outline maps showing geographic distributions of variables.
- Compute means and medians.

- Compute standard deviations and variances.
- Compute cross-tabulations, chi squares, and measures of association.
- Do *t* tests and analyses of variance.
- Compute regression and correlation coefficients.
- Compute multiple regression and correlation coefficients.
- Create new variables from old ones and manage data in useful ways.

There's no need to worry if you don't know what some of these things are. You will know all of them after finishing this text and accompanying workbook.

MicroCase is available for Windows-compatible computers like IBM, Dell, and Compaq computers. (Sorry, fellow Apple fans, but we have to use Windows computers for MicroCase.) You already own MicroCase. A version called Student MicroCase came on a CD-ROM disc with this text's workbook. Student MicroCase is a slimmed down but still powerful version of the full MicroCase.<sup>1</sup>

Don't worry if you don't know much about computers or even if you have never used one. You don't need to know much about computers themselves to make good, intelligent use of MicroCase to do statistics. You don't have to write computer programs or design computer systems—nothing like that. The accompanying workbook will give you all the information you need.

## What to Expect in This Text

Let me explain how I have organized this text. We will learn statistics by beginning with the simplest situations and then moving through increasingly complex analyses. We will start with methods for analyzing only one variable at a time. Then we will take up methods for analyzing a relationship between two variables. That's a little more complex. And finally we will consider techniques for studying relationships among three or more variables at a time. That's really complex. Sensibly enough (at least if you know some Latin), these three situations involve *univariate*, *bivariate*, and *multivariate analyses*, respectively. That is how we will proceed in this text. The workbook has exercises that encourage you to apply your knowledge of statistics and carry out computer analyses of real data.

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<sup>1</sup> Your school may have the full MicroCase if it participates in the MicroCase Curriculum Plan and has a site license. You can find out from your instructor if the full MicroCase is available at your school.

This book covers basic statistical methods. Although you will not be a full-fledged statistician after finishing *Social Statistics*, you will know enough statistics to critically evaluate others' uses of basic statistical techniques and to analyze data yourself. In other words, you will be both an informed consumer and a responsible producer of statistics. You will also be well prepared to study more advanced statistics should you choose to do so. In short, you won't learn everything about statistics from this text, but you will learn a lot.

I have written this text for students in the social sciences and related disciplines such as social work, criminal justice, public administration, and education. I assume that you need to carry out real analyses using real data, so I do not avoid the problems you and I find in the "real world"—missing information, skewed data, outliers, variables that need to be collapsed, and so on. In this text we will face the messiness that makes the social world so challenging to study and so much fun to live in. This text relies heavily on real data from sources like the U.S. Census, *Uniform Crime Reports*, and the General Social Survey—data that full-fledged social scientists analyze in their own research. Thus, we can't avoid facing the real issues and problems that come with real data. Still, there are times when messiness of data can get in the way of learning statistics, so I have not hesitated to make up data to introduce certain statistical techniques when "clean" examples foster learning. We'll use whatever data—real or imaginary—best helps us learn statistics.

I also assume that you need to present your statistical analyses to others (your instructor now, employers or a larger "public" later in your life), so I include guidelines for writing up statistical analyses, formatting tables, and constructing graphs. You will also find examples of analysis write-ups following several chapters. You will probably find these write-ups useful as models for describing your own research results. You don't need to be a professional statistician to communicate statistical findings effectively to others. You will be able to do so after finishing this text.

So this text does not skimp on nitty-gritty details about doing real statistics in the real world. But I am also concerned that you understand statistical principles and reasoning. You need this understanding to know what statistical procedures are right for given situations and to interpret statistical analyses sensibly. Therefore, I will go beyond formulas and procedures to explain why we are doing what we do. You will find almost no computational formulas in this book to facilitate calculations. Computers render such formulas unnecessary. There is, of course, a place for computational formulas. They mostly belong in a Museum of Statistical Antiquities, maybe in a glass case next to slide rules, to remind us how unpleasant and tedious statistics used to be.

But this text does not shy away entirely from formulas and calculations. To the contrary, we will learn to do calculations “by hand” before using the friendly computer to do this mostly routine work for us. Initially while learning data analysis, calculating statistics with our human brains is essential for understanding why statistics work the way they do and what the computer’s faster brain does for us. However, we will use definitional rather than computational formulas. Although less convenient and more tedious, definitional formulas describe what statistics are really about and thus are the best way to understand how statistics works. The *Doing Statistics Using MicroCase* workbook accompanying this text invites you to do paper-and-pencil calculations before carrying out computer analyses.

But in the last analysis (literally), the computer exercises in the workbook are even more important than the “by hand” exercises. I have written the workbook for you to use actively with a computer. You should, in fact, read and do most of the workbook while using a computer.

You will find this textbook and workbook conversational in style. That’s deliberate. It’s the way I teach. My students and I interact in the classroom and, within the limits imposed by print, there is no reason why you and I should not interact via this text. So, I hope you will not take my use of the second-person “you” as an unwarranted familiarity, nor my frequent use of “we” as either an affectation or a ploy. You and I—*we*—are learning statistics together even though you are learning stat for the first time and I am learning it for the umpteenth time.

When you are finished with this book, I hope you will begin a lifetime using statistics effectively. I trust that you will be an intelligent critic of others’ applications of statistics and will use statistics intelligently yourself. But beyond these practical goals, I hope you will appreciate the beauty, elegance, and grace of statistics. Like other magnificent achievements of human reason, statistics at its core is an aesthetic endeavor.

## **What You Need to Bring to This Text**

You are probably interested in what you need to know *before* you begin to learn statistics. I assume you know basic arithmetic—adding, subtracting, multiplying, and dividing. You should also be reasonably comfortable with fractions and decimals, squares and square roots, and simple equations.

Whatever else you need to know you will learn along the way. All the better if you have had a course in research methods, but that is not essential. Likewise, I hope you have had several substantive

courses in the social sciences, but those too are not really necessary. Frankly, I assume more motivation and good will on your part than I do prior knowledge.

I trust that you have a good statistics teacher. I think good textbooks matter (that's why I have worked hard on this one), but reading even the best text is less important than learning from a knowledgeable and enthusiastic teacher.

Oh yes, you also need a calculator. An inexpensive one is fine as long as it finds square roots. Some graph paper will also be useful.

## Acknowledgments

This fourth edition, like its predecessors, was written at Skidmore College. I am fortunate indeed to teach at a college so committed to the liberal arts, high-quality teaching, and support of its faculty . . . and so cognizant that these three commitments are one.

This text began with my former colleague Richard Rosenfeld, now at the University of Missouri at St. Louis. Rick extolled the virtues of MicroCase, gently nagged me to try it, suggested the need for an accompanying stat text, and then actively supported my project at critical points. Without Rick, I would not have published this book.

Many users of previous editions offered suggestions that were most helpful for revisions. Especially valuable for this fourth edition have been comments and ideas from these colleagues across the country:

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Any errors that remain are mine alone.

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## Any Comments or Suggestions?

I want very much to hear from you if you have any helpful feedback concerning this text. Let me know what you like and don't like about it, what works well and what can be improved, what might be left out and what needs to be added. E-mail me at [statprof@skidmore.edu](mailto:statprof@skidmore.edu). Or you can write me by snail mail at the following address:

William Fox  
Department of Sociology, Anthropology,  
and Social Work  
Skidmore College  
Saratoga Springs, NY 12866

One final word before we start learning statistics: I had a great time writing this book. I hope you enjoy it just as much.

Bill Fox  
Skidmore College

# 导 读

威廉·福克斯所著《社会统计学：应用MicroCase软件的课本》（第4版）是一部统计学入门教科书。该书的特点是：1. 通俗易懂，由浅入深；2. 讲求实用、强调操作。本书特别适合社会科学类的本科学生使用。此外，由于是直接引进英文原版图书，已经具有一定统计学基础的读者也可以通过阅读本书提高专业文献阅读的能力。

社会统计学是应用于经验研究的科学工具。它不仅强调统计理论的理解，而且强调数据处理和统计分析的操作能力。正如作者在本书配套作业簿（Workbook）的前言中所说：“就像烹调、修理汽车、恋爱一样，统计学的最佳学习方式也是实践，而不是阅读。”该书回避了过于晦涩、艰深的统计学术语和繁琐数学推导，甚至连统计公式也很少，采用日常语言和引人入胜的例子将读者引入统计分析的情景。即使完全没有统计知识的读者，也可以通过对本书循序渐进的学习，得到专业化的统计思维训练。在认真学习本书并成功完成本书的作业之后，读者能够形成对于社会统计学的系统化理解，并掌握社会统计学的基本概念、基本知识和基本方法。

本书分为三个部分：第一部分由四个章节构成，内容包括统计基础知识及单变量统计；第二部分由六个章节构成，介绍了不同类型的双变量分析；第三部分由两个章节构成，介绍了两种多变量分析。在统计学中，通常将双变量分析称为简单分析，而将多变量分析视为高级统计的范畴，它们的根本区别在于后者中包含了统计控制，因而具有检验变量之间的关联是否属于虚假关联的能力。

第一章对统计学的基本概念进行了系统的介绍，包括统计数据的来源（样本与总体）、统计数据的一般形式（变量与案例）、统计变量的类型（测量等级）、统计指标的性质（样本统计量与总体参数）等等。

第二章至第四章单变量统计，包括变量的频数分布、中心指标与离散指标。其中第四章中还介绍了具有重要统计意义的正态分布，并介绍了如何从样本统计推断总体参数。

第五章至第七章介绍了如何建立两个分类变量的交互频数表，对二者之间的联系进行统计检验，以及对二者之间关联强度进行测量。

第八章和第九章介绍了对一个分类变量和一个定距变量的双变量分析，包括比较两组平均数差异的 $t$ 检验和比较多组之间平均数差异的方差分析。



第十章介绍对两个定距变量之间的回归分析和相关分析。

第十一章介绍了多个分类变量的交互表分析。

第十二章介绍了多元回归分析，其中还介绍了如何应用虚拟变量作为回归的自变量。

读者对统计理论和方法的真正理解和掌握，必须通过统计分析的操作实践。过去统计研究只是少数专业人员的专利，但是计算机和统计软件的发展使统计研究日益成为大众的普遍化的社会研究探索工具。读者如果能够成功完成本书中的有关作业，便标志着已经掌握了本书所讲授的统计方法。也就是说，读者已经具备了理解和完成同类统计分析的能力，只要收集到所需的数据，便可以自己开展统计研究了。本书的作业结合了MicroCase软件应用。这一统计软件十分容易操作，只要有一定的英文基础，便可以通过作业簿上关于该软件的简单提示上手操作。

在本书的配套作业簿中提供了这一软件的学习版，并介绍了该软件的应用，而且提供了三套的实际统计或调查的数据。所以，读者完成每一个作业实际上就是借助统计软件在重复一个真正规范的社会统计“研究”。正是这种科学的“可重复性”检验了读者是否已经掌握了有关统计方法，并避免了大量的手工计算。另一方面，作者虽然为读者提供了这些便利条件，但是仍然强调初学者对一些基本指标还是应当进行手工（或仅使用简单计算器）的计算练习，以真正了解和实践其来龙去脉（因为应用统计软件时会跨越这些过程），强化自己的理解。

作者将研究方法论融入了统计教学之中，这一点应该引起读者的充分注意。掌握了统计分析方法只是形成了实际研究的一个必要条件，因为研究方法只有与一个好的研究设计和一套好的研究数据结合在一起时才可能产生有效并可靠的研究发现，而这些好的研究发现还需要得到清楚、正确的阐述才能形成一个好的最终研究成果。本书包含了很多与统计相联的研究方法论思想，并且也设计了相应的作业练习。比如在第一章第十节中强调了理论观点和研究构思对统计研究的重要性，第一章第八节论述了统计联系与因果关系之间的差别，并且在第十章第九节又再次重申发现的统计联系不等于发现了因果关系。又比如，本节在第六章第四节区分了统计意义显著和实际意义显著之间的差别。这些重要的方法论思想在实践中往往被研究人员所忽视。

统计方法很讲究应用的数据条件，其中可能涉及到变量的测量类型、案例数、以及变量的分布形式。读者在学习每一种分析方法时，都要对其所要求的数据条件加以充分注意，否则，即使是统计软件所计算的结果，实际上也是无意义的，因为计算机和统计软件并不能保证统计方法的应用是否得当，它只是对所给数据进行了一套标准