CALCULATED BETS

Computers, Gambling, and Mathematical Modeling to Win

This is a book about a gambling system that works. It tells how the author used computer simulations and mathematical-modeling techniques to predict the outcome of jai alai matches and bet on them successfully, thus increasing his initial stake by over 500 percent in one year! His methods can work for anyone; at the end of the book he tells the best way to watch jai alai and how to bet on it.

With humor and enthusiasm, Skiena details a life-long fascination with the computer prediction of sporting events. Along the way, he discusses other gambling systems, both successful and unsuccessful, for such games as lotto, roulette, blackjack, and the stock market. Indeed, he shows how his jai alai system functions like a miniature stock-trading system.

Do you want to learn about program trading systems, the future of Internet gambling, and the real reason brokerage houses do not offer mutual funds that invest at racetracks and frontons? How mathematical models are used in political polling? The difference between correlation and causation? If you are interested in gambling and mathematics, odds are this is the book for you!

Steven Skiena is Professor of Computer Science at the State University of New York, Stony Brook. He is the author of two popular books, *The Algorithm Design Manual* and the award-winning *Computational Discrete Mathematics*, a new edition of which is being published by Cambridge University Press. He is the recipient of the Office of Naval Research (ONR) Young Investigator's Award and the Chancellor's Award for Excellence in Teaching at Stony Brook.

OUTLOOKS

PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS AND THE MATHEMATICAL ASSOCIATION OF AMERICA

Mathematical content is not confined to mathematics. Eugene Wigner noted the unreasonable effectiveness of mathematics in the physical sciences. Deep mathematical structures also exist in areas as diverse as genetics and art, finance and music. The discovery of these mathematical structures has in turn inspired new questions within pure mathematics.

In the Outlooks series, the interplay between mathematics and other disciplines is explored. Authors reveal mathematical content, limitations, and new questions arising from this interplay, providing a provocative and novel view for mathematicians, and for others an advertisement for the mathematical outlook.

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Mathematical Association of America

CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE

Cambridge University Press
0521804264 - Calculated Bets: Computers, Gambling, and Mathematical Modeling to Win
Steven Skiena
Frontmatter
More information

To my parents, Morris and Ria Skiena, for introducing me to jai alai.
Children look to their parents to teach them values, and you taught
us the value of a good quiniela at an early age.

And to our new daughter Bonnie;
We look forward to teaching you the best of what our parents taught us.

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CONTENTS

PREFACE

This is a book about predicting the future. It describes my attempt to master a small enough corner of the universe to glimpse the events of tomorrow, today. The degree to which one can do this in my tiny toy domain tells us something about our potential to foresee larger and more interesting futures.

Considered less prosaically, this is the story of my 25-year obsession with predicting the results of jai alai matches in order to bet on them successfully. As obsessions go, it probably does not rank with yearning for the love of one you will never have or questing for the freedom of an oppressed and downtrodden people. But it is *my* obsession – one that has led me down paths that were unimaginable at the beginning of the journey.

This book marks the successful completion of my long quest and gives me a chance to share what I have learned and experienced. I think the attentive reader will come to understand the worlds of mathematics, computers, gambling, and sports quite differently after reading this book.

I tell this tale to introduce several things that have long interested me to a larger audience:

- *The joys of jai alai* – Jai alai is a spectator sport and gambling forum that is underappreciated and misunderstood by the public. I'd like to

acquaint a new audience with this fun and exciting game and whet the interest of current fans by making them more aware of what determines the outcome of each match. If you stick with me, you will learn the best way to watch jai alai and bet on it.

- *The power of mathematical modeling* – Mathematical models govern our economy and help forecast our weather. They predict who will win the election and decide whether your mortgage should be granted. However, the man on the street knows little about what mathematical models are and how they work. In this book, I use our jai alai system to explain how mathematical models are designed, built, and validated.

- *The mathematics of money* – Gambling and mathematics have a long and interesting history together. I'll discuss other gambling systems, both successful and unsuccessful, for such games as lotto, roulette, blackjack, and the stock market. Indeed, my jai alai system functions very much as a stock-trading system in miniature. You will learn how program-trading systems work, the future of Internet gambling, and the real reason brokerage houses don't offer mutual funds that invest at racetracks and frontons.

- *The craft of computer programming* – For most nonprogrammers, the ideas behind modern computing systems lie shrouded beneath a thick mist of buzzwords and technology. These buzzwords give no hint of the process by which computer programs are made to work or of the elegance and beauty that underlie the best software. In this book, you will discover how my students and I built a particularly interesting computer program. I use our jai alai system to explain to the layperson such computer science concepts as parsing and random number generation, why real programmers hate Microsoft, and the true glories of the Internet.

- *The aesthetics of data* – Many people don't like the looks of charts, graphs, and tables, no matter how many colors they are printed in. But done right, such data representations can be a thing of beauty – vehicles driving us to understand the story that the numbers are trying to tell. In this book, you will get to see a variety of data sets presented in several different ways. You will get a first-hand look at how to interrogate numbers and make them talk.

Finally, this is the story of a mild-mannered professor who places money on the line to test whether his system really works. Do I hit it rich

PREFACE

or end up a tragic, bankrupt figure? You will have to read to the end to see how I make out.

My goal has been to produce a book that will be interesting and understandable even to those with little background in each of our three main topics: jai alai, mathematics, and computing. I explain all the jai alai lingo that I use, and thus you will be able to appreciate what we are doing even if you have never been to a fronton. If you can understand how mortgage interest is calculated, you have all of the mathematical background you need to follow what we are doing. Even if you have never programmed a computer, you will be able to understand the ideas underlying our system. Either way, after reading this book you will have a better understanding of how and why computers are programmed.

Maybe you will even be inspired to try some mathematical modeling of your own! At the end of this book I suggest some possible projects to get you started.

I have tried to make this book as fun to read as it was to write. In particular, I have striven to be in the spirit of Bill James, the popular writer whose books on baseball go deeply into the essence of the game. He uses advanced statistical analysis and historical research to unearth hidden trends and overturn conventional wisdom. One perceptive review notes that part of the fun in reading his work comes from the spectacle of a first-rate mind wasting itself on baseball. Part of the fun of this book, I hope, is the spectacle of a second-rate mind wasting itself on jai alai.

ACKNOWLEDGMENTS