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Crime, Drugs, Cheating Teachers, and Other Concerns Ripe for Scientific Data Analysis

Freakonomics: A Rogue Economist Explores the Hidden Side of Everything. *By Steven D. Levitt and Stephen J. Dubner, William Morrow, New York, 2005, 256 pages, $25.95.*

BOOK REVIEW

By James Case

Steven Levitt, a professor of economics at the University of Chicago, and Stephen Dubner, the author of two previous popular science books, have produced a surprisingly readable and highly provocative book about scientific data analysis. The data they chose concern crime, drugs, home buying, education, teaching to the test, cheating on tests, computer dating, race relations, and other matters of current concern. Moreover, they have more to say about the sources of the data they analyze, and the conclusions they draw from it, than they do about methodology. For technical detail, they refer the interested reader to the original literature. The book has been on *The New York Times* list of (nonfictional) best sellers for the past nine weeks, in third place as of this writing; Levitt and Dubner are the authors of a column, also called "Freakonomics," that appears from time to time in the *Times Magazine*.

By far the book's most controversial finding concerns an apparent link between violent crime and abortion. Specifically, the authors assert that the abrupt and wholly unexpected downturn in the incidence of violent crime that began around 1990 was due in large part to the Supreme Court's 1973 decision in the matter of Roe v. Wade. Levitt's original paper on the subject, written with a collaborator named John Donohue in 2001, managed to offend almost everybody. While conservatives fulminated at the very suggestion that abortion might rank among the world's most effective crime-fighting techniques, liberals recoiled from the notion that poor black women might be blamed for the eventual misdeeds of their offspring. As a result, the authors were denounced as ideologues, racists, eugenicists, subversives, and evil doers by critics of every stripe.

They begin their chapter on the subject with a list of seven commonly suggested causes of the decreasing crime rate, including innovative policing strategies, tougher gun control laws, increased prison capacities, and a stronger economy. They argue—by citing all manner of "reliable studies"—that only three of the seven causes championed by conventional wisdom can be shown to have contributed in any way to the drop in crime, and that no conceivable combination of the three could account for the observed magnitude of the decline. As a rough measure of that decline, the authors observe that the U.S. homicide rate fell from 30.7 per hundred thousand in 1990 to just 8.4 per hundred thousand in 2000.

An ordinary foot-soldier in a drug-distributing gang on Chicago's South Side could count on only $4000 to $5000 a year—somewhat less than a full-time minimum-wage earner brings home. It is hardly surprising that rank-and-file gang members lived with their mothers.

The number of abortions in the U.S. rose from about three quarters of a million in 1973, the year of Roe v. Wade, to about 1.6 million in 1980, before leveling off. That means that almost 0.8 million mostly poor, mostly black male children per year were no longer being born to mostly black, mostly ill-educated single mothers during that time. And, because poverty, single parenthood, and low level of maternal education are among the most reliable predictors of future criminal activity, it is hardly surprising that a substantial decline in such activity should be observed fifteen to twenty years later. But the mere fact that there was such a decline hardly proves that it was caused by the legalization of abortion.

To support their contention that "abortion was one of the greatest crime-lowering factors in American history," the authors point out that the decline in violent crime oc-curred sooner in states that, like New York and California, legalized abortion before 1973, and that the states with the highest abortion rates tended to experience the largest reductions in crime. Moreover, there is virtually no correlation between in-state crime rates and abortion rates in the years between 1973 and 1988, during which the unborn children would have been too young to affect the statistics on violent crime. Does this mean that any future overthrow of Roe v. Wade will automatically be followed, after an interval of fifteen to twenty years, by a massive increase in violent crime? The authors are plainly convinced that—absent dramatic changes in the conditions under which at-risk children are raised—such an increase is all but inevitable. But that doesn't mean their evidence is irrefutable, or that any attention will be paid to it if and when the Supreme Court (in accordance with the wishes of the religious right) elects to revisit the issue.

Among the most interesting chapters in the book, at least to this reviewer, is the one titled "Why Do Drug Dealers Still Live With Their Moms?" The data that enabled the authors to write such a chapter fell almost by accident into the hands of an Indian-born, American-raised graduate student in sociology at the University of Chicago. To gather data for his thesis, the student had persuaded J.T., the leader of a drug-distributing gang on Chicago's South Side, to allow him to embed himself in their midst, on the condition that J.T. be allowed to censor any information that, if published, might prove harmful to the gang. One day the student was approached by a gang member who suspected (rightly, as it turned out) that he would soon be killed, and expressed a desire to atone in some small way for his many misdeeds. Thereupon, he handed over a series of notebooks containing J.T.'s meticulously maintained financial records for four consecutive years.

J.T.'s gang was one of about a hundred branches (read franchises) of a much larger organization. Of its (tax-free) revenues, about twenty percent went directly to the 20-member "board of directors" for the right to sell crack cocaine in a designated 12-square-block area. The other eighty percent belonged to J.T., to dispose of as he saw fit. From it, he kept about $100,000 a year, compared with the $500,000 a director of the organization could expect to clear, with the $8000 to $10,000 his three highest-ranking subordinates could expect to earn, and with the $4000 to $5000

an ordinary foot-soldier in the gang could count on. Because the latter is somewhat less than a full-time minimum-wage earner brings home, it is hardly surprising that rank-and-file gang members lived with their mothers. While the top 120 men in the gang represented less than 2.3% of the total membership, they retained more than half the profits.

The authors express amusement that, at a time when white suburbanites were studiously mimicking black rappers' ghetto culture, black ghetto criminals were recreating the corporate culture of the white suburbanites' fathers. What the gangs could not duplicate was the low degree of risk involved in legitimate business. A member of J.T.'s gang for all four years of the study period could expect to be arrested 5.9 times, non-fatally wounded 2.4 times, and killed with 25% probability. J.T. himself wound up in jail mere months after being promoted to membership on the board of directors. The fact that turf warriors have since tacitly agreed to shoot rival gang members in the buttocks, instead of killing them, has diminished the level of risk borne by street-level drug-dealers to some extent. Simultaneous-ly, the number of full-time jobs in the industry has declined along with the retail price.

Levitt and Dubner are greatly interested in educational issues, which occupy all or most of several chapters. Among the more unusual educational issues they address is the detection of cheating on the part of teachers anxious to elevate their students' scores on standardized tests. In this case the authors used a database obtained from the Chicago Public School (CPS) system, containing every answer given to every test question asked of every CPS student from the third to the seventh grade between 1993 and 2000—nearly 100 million individual answers in all. The questions were all multiple choice, with four options per question—*a*, *b*, *c*, or *d*—and with no penalty for wrong answers. The results for a given test and classroom were recorded in an alphanumeric matrix (m_{ij}) in which each row corresponded to a student and each column to a question. If student *i* chose alternative *a* for question *j*, then $m_{ij} = a$ if *a* was the correct answer and $m_{ij} = 1$ if it was not. The same notation was used for the other alternatives, with *b*/2, *c*/3, and *d*/4; $m_{ij} = 0$ was reserved for the case in which student *i* left question *j* unanswered.

On the theory that a cheating teacher might memorize a short sequence of correct answers near the end of the test—where the questions are harder, and the students more likely to leave them blank—and fill them in himself before turning in the papers for machine grading, an algorithm was devised for detecting alphanumeric sequences common to suspiciously many papers.

On the theory that a cheating teacher might memorize a short sequence of correct answers near the end of the test—where the questions are harder, and the students more likely to leave them blank—and fill them in himself before turning in the papers for machine grading, an algorithm was devised for detecting alphanumeric sequences common to suspiciously many papers. When the analysis revealed that the seven-character sequence *dadbcb*4 appeared in columns 30–36 of 15 of the 22 papers handed in by the students in a particular underperforming class, malfeasance was suspected. The final 4 suggests that the teacher herself did not know the correct answer to question 36.

Analysis of the entire Chicago data set suggested that cheating had taken place in about 200 classrooms, roughly five percent of the total. This is an obvious underestimate, because the algorithm detects only one of many possible forms of cheating. Moreover, the evidence obtained is insufficient grounds for termination of a teacher. Nevertheless, in conjunction with a limited retesting program, the algorithm eventually led to the identification and firing of a dozen of CPS's worst offenders. That might not seem like a lot, but at least it conveys the message that cheating is a risky method for impersonating an effective teacher.

The authors explain the purposely strange title of their book by observing that

> "Economics is above all a science of measurement. It comprises an extraordinarily powerful and flexible set of tools that can reliably assess a thicket of information . . . about jobs and real estate and banking and investments. But the tools of economics can just as easily be applied to subjects that are more . . . interesting."

Nowhere do they acknowledge that the tools in question are nothing more than a subset of the tools of statistical inference, superficially modified in a few cases to accommodate the peculiarities of economic data. Nor do they acknowledge that other sciences are far better known than economics for their success in extracting reliable conclusions from noisy data. Indeed, by their omissions, the authors manage to convey a very different impression. As a result, parts of the book read like an attempt to generate consulting business for econometricians by stealing it from the people who invented the methods of statistical inference and pioneered their use. If left unchallenged, it seems altogether likely to have exactly that effect.

James Case writes from Baltimore, Maryland.