Book Reviews

TALEB, NASSIM NICHOLAS (2007)
The Black Swan: The Impact of the Highly Improbable
New York: Random House
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Taleb pulls no punches. A few representative quotations from chapter 15, titled "The Bell Curve, the Great Intellectual Fraud," show that he goes straight to work:

> Forget everything you heard in college statistics or probability theory. (p. 229)

> If you ever took a (dull) statistics class in college, did not understand much of what the professor was excited about, and wondered what "standard deviation" meant, there is nothing to worry about. The notion of a standard deviation is meaningless. . . . Clearly it would have been more beneficial, and certainly more entertaining, to have taken classes in the neurobiology of aesthetics or postcolonial African dance . . . (p. 239)

> There are other notions that have little or no significance outside of the Gaussian: correlation and, worse, regression. Yet they are deeply ingrained in our methods . . . (p. 239)

Harsh words are directed against some scholars, including some Nobel laureates, but praise is given to others, including some Nobel laureates. So Taleb is straightforward in dealing with conceptual material, as well as with people. The real issue here is that if his indictment of parametric statistics is justified, then we need to pay attention, because psychologists and other social scientists use these tools daily.

To begin to understand Taleb's position, it is essential to realize that he graduated from Wharton (1987) and had a career as a derivatives trader. He called himself a "quant"—"a quant is a brand of industrial scientist who applies mathematical models of uncertainty to financial (or socioeconomic) data and complex financial instruments. Except that I was a quant in reverse: I studied the flaws and limits of these models, looking for the 'Platonic Fold' where they break down. Also I engaged in speculative trading, not 'just tawk,' which was rare for quants since they were prevented from 'taking risks,' their role being confined to analysis, not decision making" (p. 19). Taleb's two decades of experience generated a profound distrust of parametric statistics as they are applied to the assessment of risk and uncertainty, but most of all to making economic predictions.

Black swans are quite rare but do occur in Australia, and they serve

as the central and titular metaphor of this book. For Taleb, a Black Swan is an exceedingly rare but profoundly consequential event, one that has a determining effect on the course of history and the world economy. Major wars, stock market crashes, volcanism, the industrial revolution, and the computer revolution are all examples, some negative, others positive, but none were predictable. "I stop and summarize the triplet: rarity, extreme impact, and retrospective (though not prospective) predictability. A small number of Black Swans explain almost everything in our world, from the success of ideas and religions, to the dynamics of historical events, to elements of our own personal lives" (p. xviii). Taleb does a reasonable job of supporting his assertions about the creative or destructive effects of Black Swans, and this material is absolutely worth reading. Interested readers should look especially at figure 14, on page 276, as an example of the strength of Taleb's case. But his wholesale dismissal of parametric statistics is another matter. True enough, these statistics cannot predict Black Swans, as 10-standard-deviation events ought to be so improbable as to defy conceptualization, visualization, or any other form of forecasting. Since such events do occur, bringing huge consequences, we might agree with Taleb that Gaussian statistics are inappropriate for economic forecasting, but does this simultaneously justify tossing them out completely? Is there no reasonable point of application?

In fairness to Taleb, he distinguishes between two domains, Mediocristan and Extremistan, to which Gaussian statistics are and are not applicable, respectively. His test for deciding in which domain to place a variable is straightforward: Imagine sampling at least 1,000 randomly selected cases of the variable; then ask yourself whether single cases exist in the population that could exert a major change on either the accumulated sum or the mean. If so, the distribution belongs to Extremistan; if not, then the distribution probably belongs to Mediocristan. Think of variables like income or net worth. If your 1,000 or even 10,000 randomly sampled cases do not include Bill Gates or Warren Buffett, then cases exist out there in the population that could exert profound effects on your sum and mean. For most variables in psychological research, Black Swan outliers as extreme as these do not exist; at least we are unaware of them. On the other hand, we can think of a few variables that might be from Extremistan (e.g., various measures of sexual attitudes and behavior, measures of criminality and religiosity) in that some Black Swan extremes are possible, and they might have large medical, social, or financial consequences. Also, the impacts of new theoretical ideas and methodologies are two variables likely to be from Extremistan. Psychologists certainly need to be mindful of their relative inability to forecast Black Swans, regardless of the potential importance of these birds. Furthermore, Taleb presents, throughout the book, advice for dealing with Black Swans and their close relatives, Gray Swans; in chapter 19 he says, "I am very aggressive when I can gain exposure to positive Black Swans . . . and very conservative when I am under threat from a negative Black Swan" (p. 296). Although he cannot forecast Black Swans, part of his genius is to recognize them when they are occurring, and he tells us how to do it. Naturally, Taleb's methods do not depend on parametric statistics. We suspect that psychologists can learn to deal with Black Swans by reading this book.

Many of us use parametric statistics to analyze the results of experiments, and another important set of considerations comes into play in this context. With relatively small samples, one can run into well-known problems, like

heterogeneity of variance, that sometimes require special treatment or even recourse to nonparametric methods. But aside from these difficulties, we know that sampling distributions of means are typically normal (Gaussian), regardless of the shape of the underlying raw score distribution. This fact implies that parametric statistics are usually justified for our comparisons of means, provided that samples are of adequate size and that we meet the usual requirements, such as independence of observations and reliability of measures. Hence, much of the force of *The Black Swan* is lost on experimentalists, even if some correlation/regression researchers could be powerfully affected by it. Taleb probably would not agree with this assertion about the relative safety of experiments and associated parametric statistics, claiming that Black Swans could be lurking in our subject populations and can swamp an otherwise beautiful experiment. While this might be so, Tukey's exploratory data analysis or just plain common sense will certainly pick up an extreme outlier, allowing us to extract its influence from the rest of the data set and permitting us to draw conclusions conditional on the presence or absence of the Black Swan. Indeed, "catching" Black Swans and then inquiring into their genesis would constitute a reasonable strategy for experimentalists, especially if the Black Swans were caused by experimental conditions, even if only rarely. We are reminded of Julius Axelrod's discovery of *N*-acetyl-para-aminophenol (also known as acetaminophen and Tylenol) and Rosalyn Yalow's "rejected paper" that contained the first report of radioimmunoassay technology, as well as her revolutionary discovery that antibodies can be formed in reaction to small peptides. These were Black Swans (Taleb might call them Gray Swans), but they were manageable ones because of the controlled experimental context and the prepared minds of the scientists involved. Taleb is certainly correct about the uncontrolled wildness of Black Swans in the economy or elsewhere in the natural or political worlds, but in most experimental situations they are likely to bring the excitement of discovery without the fear of disaster, and they pose little difficulty for inferential statistics.

Taleb has heroes, and some of them will be known to readers of this journal (e.g., D. S. Kahneman, A. Tversky); others maybe less so (B. Mandelbrot). We mention these names to show that *The Black Swan* is not exclusively an attack on the academic community; the book heaps praise in certain quarters. Yet the pages contain a fair amount of vitriol, sometimes humorous, sometimes not. Taleb could have benefited from careful editing. Likewise, in the numerous digressive and self-indulgent sections, a strong editorial hand could have worked blessings on the reader. In spite of these matters, the essential messages of *The Black Swan* ought to be read by all social scientists, especially those who teach and use parametric statistics. It is important that we be forced to defend our habitual practices, and *The Black Swan* will elicit defensive behaviors.

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