THE BLACK SWAN

The Impact of the Highly Improbable

Nassim Nicholas Taleb

RANDOM HOUSE
TRADE PAPERBACKS

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The Impact of the Highly Improbable

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NEW YORK

Chapter 5

Part 1

UMBERTO ECO'S ANTILIBRARY, OR HOW WE SEEK VALIDATION

Chapter 1

Chapter 3

Chapter 4

Chapter 5

Chapter 6

Chapter 7

Chapter 8

Chapter 9

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* Chapter 10

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Table 1

TABLE 1

Extremistan

Scalable

Wild (even superwild) or type 2 randomness

The most typical member is either giant or dwarf, i.e., there is no typical member

Winner-take-almost-all effects

Today's audience for an artist

More likely to be found in our modern environment

Vulnerable to the Black Swan

There are no physical constraints on what a number can be

Corresponds to numbers, say, wealth

Dominated by extreme winner-take-all inequality

Total will be determined by a small number of extreme events

It takes a long time to know what's going on

Tyranny of the accidental

Hard to predict from past information

History makes jumps

The distribution is either Mandelbrotian “gray” Swans [illegible] or totally intractable Black Swans

* What I call “probability distribution” here is the model used to calculate the odds of different events, how they are distributed. When I say that an event is distributed according to the “bell curve,” I mean that the Gaussian bell curve (after C. F. Gauss; more on him later) can help provide probabilities of various occurrences.

[illegible]

Chapter 9 *

[illegible]

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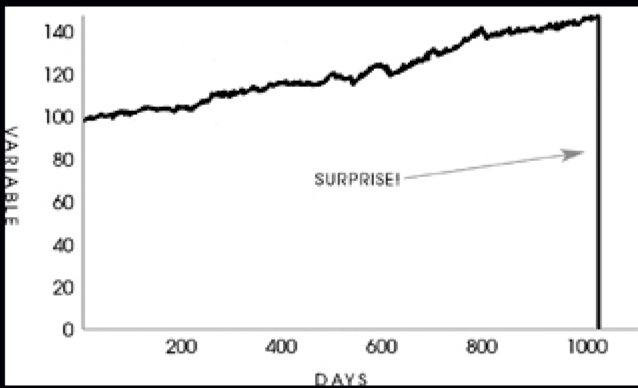
140
120
100
80
60
40
20
0
VARIABLE
SURPRISE!
200
400
600
800
1000
DAYS

Figure 1

Chapter 17 *

Chapter 1

Figure 1 Chapter 4

Chapter 1

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Chapter 3

Chapter 13

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Chapter 10

[redacted]

Chapter 15

Chapter 5

[redacted]

Chapter 4

Chapter 4

Chapter 3

Chapter 3

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Chapter 3

[illegible]

I AM A BLACK SWAN: THE ANTHROPIC BIAS

[illegible]

picture into my own biography I am alarmed at how tenuous my life has been so far. Once when I returned to Lebanon during the war, at the age of eighteen, I felt episodes of extraordinary fatigue and cold chills in spite of the summer heat. It was typhoid fever. Had it not been for the discovery of antibiotics, only a few decades earlier, I would not be here today. I was also later "cured" of another serious disease that would have left me for dead, thanks to a treatment that depends on another recent medical technology. As a human being alive here in the age of the Internet, capable of writing and reaching an audience, I have also benefited from society's luck and the remarkable absence of recent large-scale war. In addition, I am the result of the rise of the human race, itself an accidental event.

My being here is a consequential low-probability occurrence, and I tend to forget it.

Let us return to the touted recipes for becoming a millionaire in ten steps. A successful person will try to convince you that his achievements could not possibly be accidental, just as a gambler who wins at roulette seven times in a row will explain to you that the odds against such a streak are one in several million, so you either have to believe some transcendental intervention is in play or accept his skills and insight in picking the winning numbers. But if you take into account the quantity of gamblers out there, and the number of gambling sessions (several million episodes in total), then it becomes obvious that such strokes of luck are bound to happen. And if you are talking about them, they have happened to you.

The reference point argument is as follows: do not compute odds from the vantage point of the winning gambler (or the lucky Casanova, or the endlessly bouncing back New York City, or the invincible Carthage), but from all those who started in the cohort. Consider once again the example of the gambler. If you look at the population of beginning gamblers taken as a whole, you can be close to certain that one of them (but you do not know in advance which one) will show stellar results just by luck. So, from the reference point of the beginning cohort, this is not a big deal. But from the reference point of the winner (and, who does not, and this is key, take the losers into account), a long string of wins will appear to be too extraordinary an occurrence to be explained by luck. Note that a "history" is just a series of numbers through time. The numbers can represent degrees of wealth, fitness, weight, anything.

Chapter 6

Chapter 6

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[redacted]

Chapter 5

Chapter 15

Chapter
8

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When I ask people to name three recently implemented [illegible] usually propose the computer, the Internet, and the [illegible] unappreciated upon their discovery, and remained unapp[illegible] consequential. They were Black Swans. Of course, we hav[illegible] master plan." You can create your own lists with simila[illegible] intellectual epidemics.

You would expect our record of prediction to be horrible[illegible] which is not a problem, except when most of us don't kno[illegible] making it business as usual. Black Swan[illegible]

[illegible] ns. Prediction is firmly institutionalized in our world. We are [illegible] whether the fortune-teller or the well-published (dull) [illegible]

[illegible] It is tough to make predictions, especially about the future.

While he did not produce the writings that would allow him to be considered a philosopher, in spite of his wisdom and intellectual abilities, Berra can claim to know something about randomness. He was a practitioner of uncertainty, and, as a baseball player and coach, regularly faced random outcomes, and had to face their results deep into his bones.

In fact, Yogi Berra is not the only thinker who thought about how much of the future lies beyond our abilities. Many less popular, less pithy, but not less competent thinkers than he have examined our inherent limitations in this regard, from the philosophers Jacques Hadamard and Henri Poincaré (commonly described as mathematicians), to the philosopher Friedrich von Hayek (commonly described, alas, as an economist), to the philosopher Karl Popper (commonly known as a philosopher). We can safely call this the Berra-Hadamard-Poincaré-Hayek-Popper conjecture, which puts structural, built-in limits to the enterprise of predicting.

"The future ain't what it used to be," Berra later said.* He seems to have been right: the gains in our ability to model (and predict) the world may be dwarfed by the increases in its complexity—implying a greater and greater role for the unpredicted. The larger the role of the Black Swan, the harder it will be for us to predict. Sorry.

Before going into the limits of prediction, we will discuss our track record in forecasting and the relation between gains in knowledge and the offsetting gains in confidence.

* Note that these sayings attributed to Yogi Berra might be apocryphal—it was the physicist Niels Bohr who came up with the first one, and plenty of others came up with the second. These sayings remain, however, quintessential Berraisms.

Chapter 6

Chapter 1

Chapter 17

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Chapter 8

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Chapter 5

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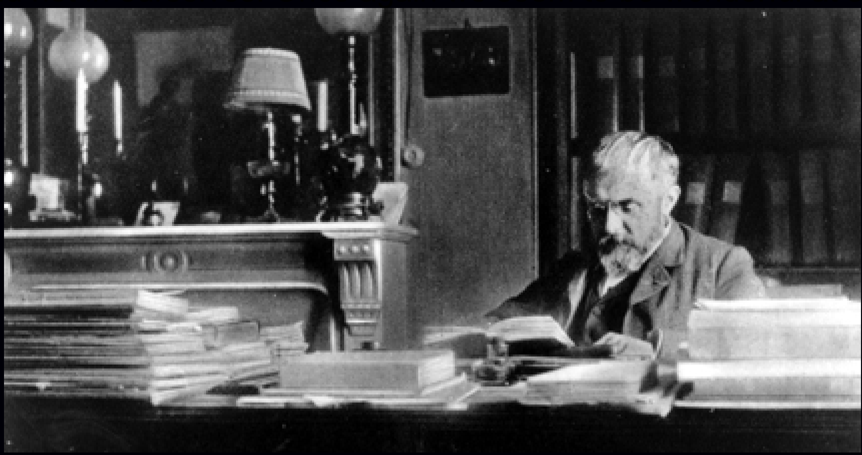
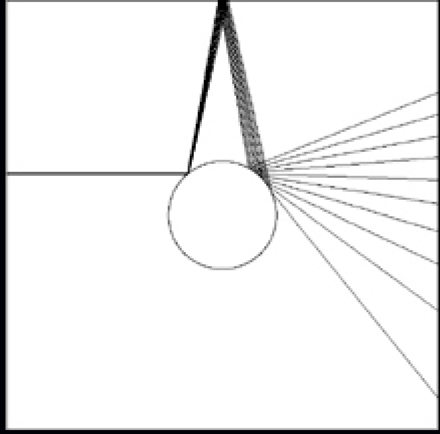
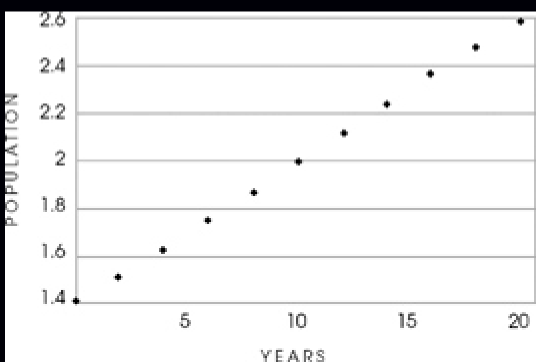


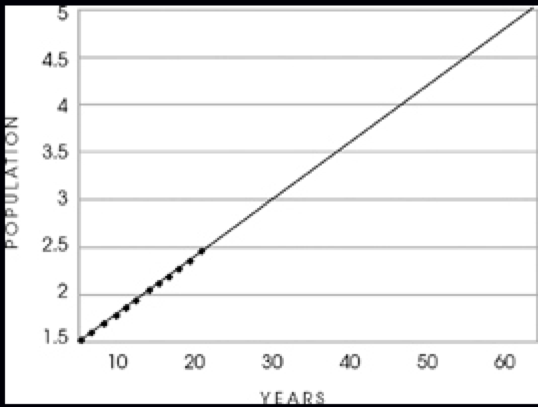


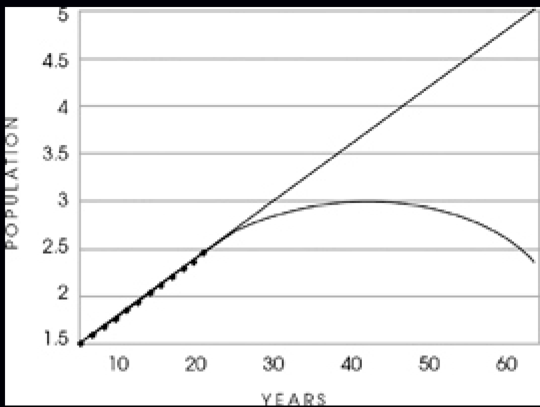
Chapter 8

Chapter 9

Chapter 17







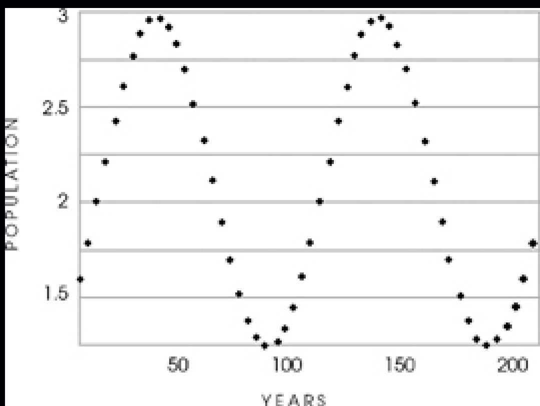


Figure 1 Chapter 4

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Chapter 8

Chapter 7

Chapter 10

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Part 3

THOSE GRAY SWANS OF EXTREMISTAN

Chapters 15 17 Chapter 16

Part 4

Chapter 3

Chapter 1

Chapter 10

Chapter 3

Chapter 4

Chapter 3

Chapters 15 16


AU6561842D0
DEUTSCHE BUNDESBANK
Banknote
10
Deutsche Bundesbank
Frankfurt am Main
2. Januar 1989
AU6561842D0
10

Chapter 3

Chapter 3

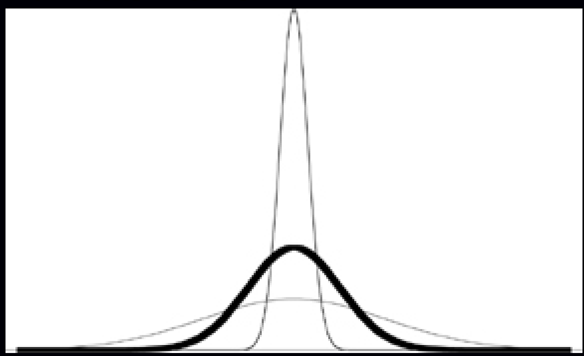
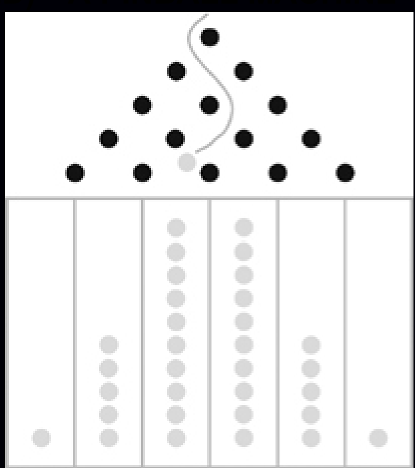


Figure 8



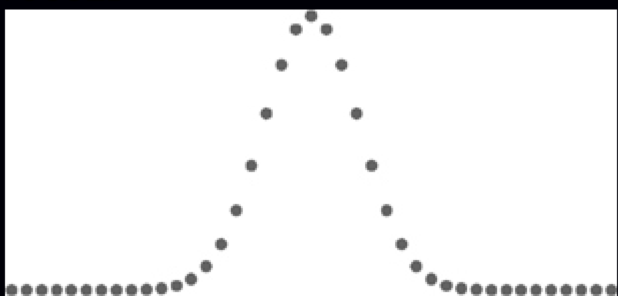


Figure 9

Figure 10

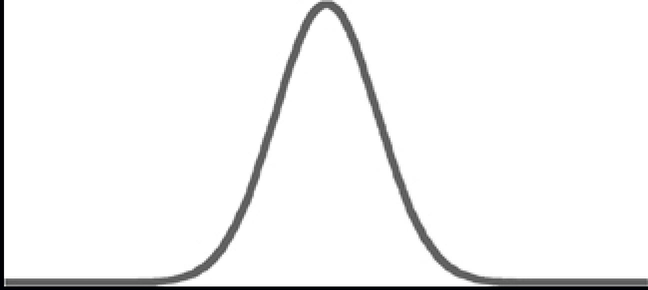


Figure 10

Chapter 14

Chapter 14

Chapter 14

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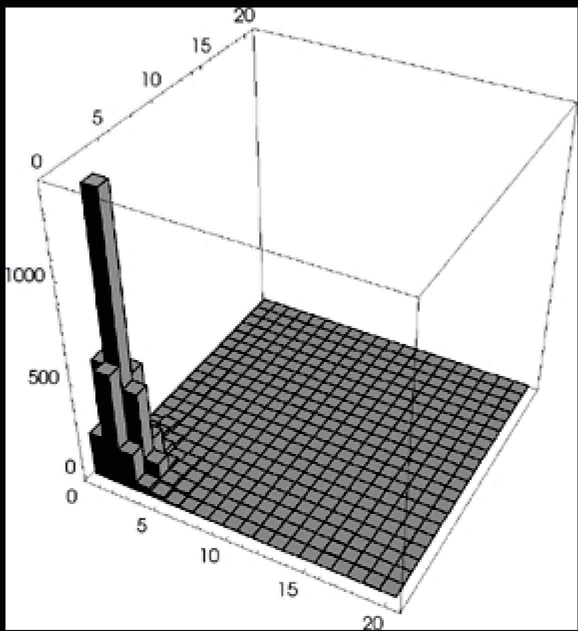
Figures 11 12

Chapter 15



* Source: M.E.J. Newman (2005) and the author's own calculations.

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Table 3

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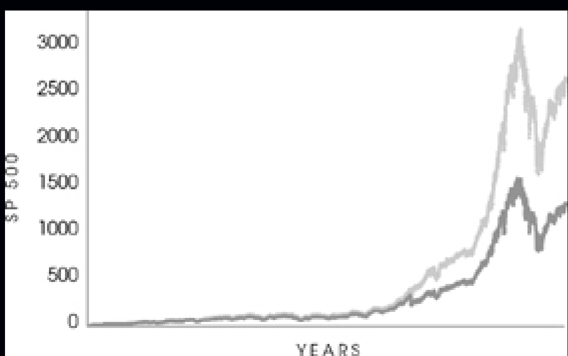
Figure 14

Chapter 1

Chapter 15



Chapter 10

Chapter 5

Chapter 4

Chapter 11

Figure 7 Chapter 15

Chapter 15

Chapter 8

Chapter 8

Chapter 17

Part 4

THE END

Chapter 3

Chapter 8

Postscript Essay

ON ROBUSTNESS AND FRAGILITY, DEEPER PHILOSOPHICAL AND EMPIRICAL REFLECTIONS

ON SLOW BUT LONG WALKS

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Chapter 10

Chapter 14

Chapter 6

Chapter 11

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Chapter 11

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Chapter 16

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Chapter 11

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Chapter 8

Chapter 16

Chapter 10

Chapter 1

Chapter 15

Chapter 13

TABLE 2: THE FOUR QUADRANTS

	I Simple Payoffs	II Complex Payoffs
A Mediocristan	First Quadrant ***Extremely Safe***	Second Quadrant ***(Sort of) Safe***
B Extremistan	Third Quadrant ***Safe***	Fourth Quadrant ***Black Swan Domain***

Chapter 13

[redacted]

* [redacted]

επαγωγη

www.nobel.se

www.annuityadvantage.com/lifeexpectancy.htm

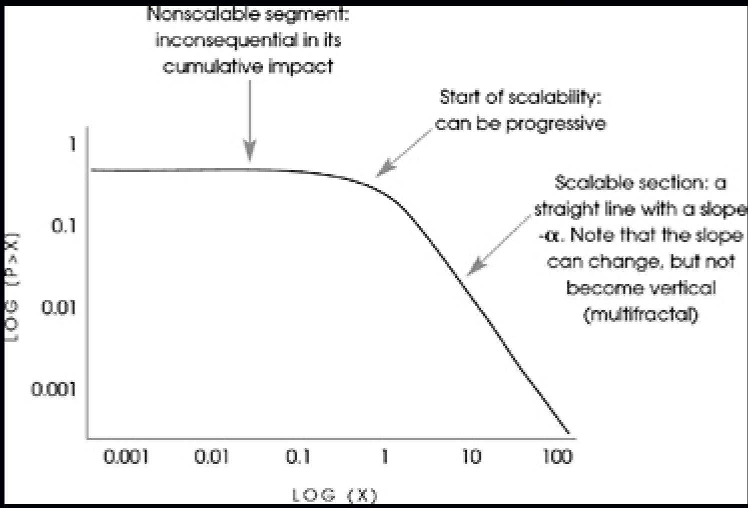
$$E[x|x>a] = \frac{\int_a^\infty x f(x)\,dx}{\int_a^\infty f(x)\,dx}.$$

www.bell-labs.com/project/feature/archives/cosmology/

www.nobel.se

$\frac{P_{>x}}{P_{>nx}}$

Figures 15 16


Nonscalable segment: inconsequential in its cumulative impact
Start of scalability: can be progressive
Scalable section: a straight line with a slope -α. Note that the slope can change, but not become vertical (multifractal)
LOG (P>X)
1
0.1
0.01
0.001
0.001
0.01
0.1
1
10
100
LOG (X)


Scalable: straight line (slope close to 1.5) to "infinity"
It might become vertical somewhere (i.e., α - > -Infinity) but **we don't know where!**
Gaussian, Poisson, and nonscalables
LOG (P>X)
0.1
0.001
0.00001
1
2
5
10
20
50
100
LOG (X)

http://xxx.lanl.gov

www.edge.org

http://home.planet.nl/~viss1197/japaflyvbjerg.pdf

www.prospect.org/print/V5/17/frank-r.html

www.interdisciplines.org

http://xxx.lanl.gov

http://repositories.cdlib.org/iberecon/

www.interdisciplines.org

www.merit.unimaas.nl/publications/rmpdf/2004/rm2004-021.pdf

www.merit.unimaas.nl/publications/rmpdf/2005/rm2005-017.pdf

www.decisionresearch.com

Chapter 8

Chapter 8

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Chapter 11

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PHOTO: © SARAH JOSEPHINE TALEB

NASSIM NICHOLAS TALEB has devoted his life to immersing himself in problems of luck, uncertainty, probability, and knowledge, and he has led three high-profile careers around his ideas, as a man of let businessman/trader, and as a university professor. Although he spends most of his time as a flâneur, meditating in cafés across the planet, he is currently Distinguished Professor at New York University's Polytechnic Institute and a principal of Universa LP. His books, *Fooled by Randomness* and *The Black Swan*, have been publishe in thirty-one languages.