Harvard Business Review ITALIA

GIUGNO 2018
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POSTE ITALIANE SPA – SPEDIZIONE IN ABBONAMENTO POSTALE – D.L. 353/2003 (CONV. IN L. 27/02/2004 N. 46) ART. 1 COMMA 1, DCB MILANO. PRIMA IMMISIONE SUL MERCATO: 1 GIUGNO 2018

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€ 13,50

Strategics EDIZIONI

The article titled "80/20 is a Fractal Law of Nature" was published in Italian in the June 2018 issue of Harvard Business Review Italia. This the original version in English that was sent to the editors.

80/20 is a Fractal Law of Nature

Vilfredo Pareto's Principle isn't just for business; it applies to everything. When combined with chaos theory, it makes terrifyingly accurate predictions.

By Perry Marshall

Dimitri was an engineer who sent my company very small orders and was forever dissatisfied. "You lack Feature X. You lack Feature Y. If you don't fix it, we'll take our business to ACME."

Every time Dimitri would complain, I'd feel insecure. I'd ask engineering for Feature X.

I heard about the 80/20 rule, which says 80% of sales come from 20% of customers, and 20% of sales from the other 80%. "Could that be right? Is this *always* true?" I printed a sales report, ranking accounts from biggest to smallest.

"Dang, 80/20 is right. When I get 20% down the list, sales are 80%."

I thought, "Dimitri is among the bottom 80% of customers who only buy 20%. I should find a better customer instead of trying to please him. There's no good reason to bend over backwards."

But I never did anything about it. Dimitri continued to pester me, so I bugged the engineers to add more features.

Why? *Because I didn't understand 80/20.*

Five years later I'm reading Richard Koch's book *The 80/20 Principle.* In a section called "The 80/20 Principle and Chaos Theory" he says:

> …it seems much more accurate to view the world as an evolving organism where the whole system is more than the sum of its parts, and where relationships between the parts are nonlinear….The snag with linear thinking is that it doesn't always work, it is an oversimplification of reality.
>
> Chaos theory and the 80/20 Principle assert (with a great deal of empirical backing) that the universe is unbalanced. They both say that the world is not linear; cause and effect are rarely linked in an equal way.

My brain melted. "80/20 is fractal!" Richard had not said this, but it was implicit in chaos theory. Suspecting its importance, I jumped up and raced home.

Italian online version:
https://www.hbritalia.it/giugno-2018/2018/06/04/news/l80-20-e-una-legge-di-natura-frattale-3513/

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A fractal is a pattern inside a pattern inside a pattern. These patterns run infinitely, recursively repeating.

"This means there's an 80/20 inside every 80/20! It means 20% of 20% of customers produce 80% of 80%. 4% contribute 64%. It means 20% of 20% of 20% produce 80% of 80% of 80%. 52% of money comes from 0.8% of customers. This is also true of product defects and time management. Plus web traffic and support tickets and 100 other things."

Thirty minutes later I was sprawled across my living room floor with a calculator, finding 80/20 patterns *everywhere* in my business.

This was one of the biggest epiphanies of my life. I began organizing my business around 80/20.

80/20 means business is exponential. 80/20 made it simple to crack the code on Google AdWords, then later, Facebook advertising and the Star Principle.

I found that:

1) 80/20 is a fundamental rule of cause and effect. 80/20 is not merely a business rule of thumb, it's a law of nature, like gravity. 80/20 does not just apply to business and economics. It's equally true in river flows, rabbit populations, and craters on the moon.
2) 80/20 is fractal: levers inside of levers. 80/20 describes incomes of the whole world population, yet is still true for the ten richest people in the world.
3) Most people think in terms of averages and bell curves. But in business and life, it's far more useful to think in terms of exponential curves and power laws.

Most people know Vilfredo Pareto discovered wealth distribution across countries is 80/20; but 80/20 is far bigger. His insights were as big as the light bulb or quantum physics. Pareto is one of the 100 most important thinkers in modern times.

So I switched from the bell curve to a new curve called the 80/20 curve. If 100 students take a test, a bell curve emphasizes the average. But the 80/20 curve highlights performers.

If the average in a science test is 77%, and you want a scientist, you'd never hire 95% of the class. You only care about the top 1-2 students, *because they possess more science power than all other students put together*.

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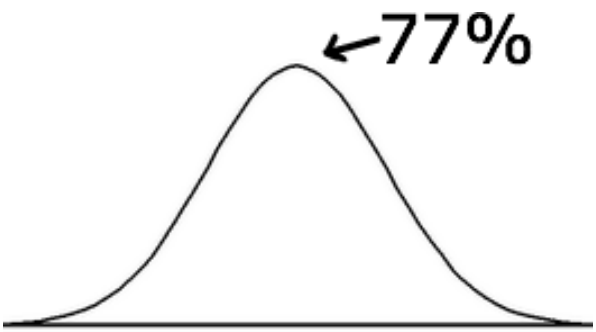
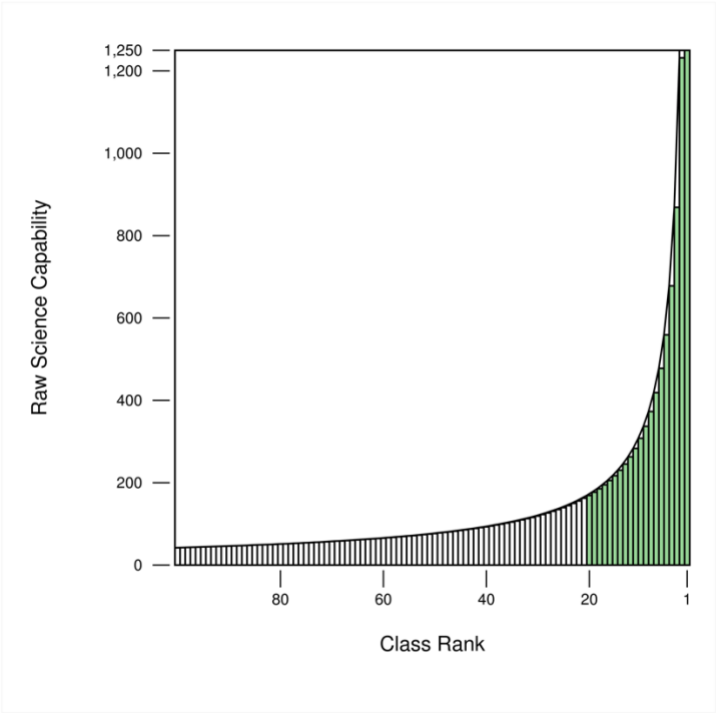


CAPTION: The bell curve emphasizes the performance of the average student



CAPTION: The 80/20 Curve highlights the power of the very best. The vertical scale is "raw science capability."

Steve Jobs said, "If you go to New York City and get an average taxi cab driver versus the best taxi cab driver, you'll probably get to your destination with the best taxi driver 30% faster… but the difference between the average software developer and the best is 50:1, maybe even 100:1."

Bell curves hide performers. The 80/20 Curve makes performers obvious.

I imagined a ramp-like curve shooting up faster as you approach the right asymptote. The area below the curve is the output of the population.

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I couldn't find 80/20 drawn this way. The closest was the "Pareto Distribution," which was abstract and counterintuitive. I needed a new tool, a heuristic that accurately predicted the fractal behavior of 80/20. This tool is online at www.8020curve.com.

Making 80/20 easy leads to valuable predictions. If 1500 people buy a €5 espresso each week at Lavazza, *one* of those *existing customers* will spend €2700 on a new espresso machine. 15 will buy a €250 espresso machine.

If you're not selling espresso *and* espresso machines, you're losing at least €6400 of sales every week!

80/20 is the math of upsells. Fractal 80/20 means if you know the average *anything* – customers, employees, products, sizes of Fortune 500 companies, the value of time – you can predict all else. With terrifying accuracy.

Dimitri was a blip on the left side of the 80/20 Curve. Too many headaches, too little money. You can apply 80/20, ignore most requests, and focus on a few big levers. You say *no* much more often. Achieve more by doing less.

80/20 tells who and what you say "no" to. **"The difference between successful people and very successful people is that very successful people say no to almost everything." -Warren Buffett**
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Sidebar

The Math Behind the 80/20 Curve

The numbers "80" and "20" are situation dependent. Ratios of 60/40, 70/30, 95/5 and 99/1 are common. But symmetry remains. As does fractal behavior: in a 70/30 curve, there's another 70/30 inside the 30.

To formalize this, define R as the ratio of minor input to total input. We call this the Pareto Ratio. For 80/20, R=0.8. For 70/30, R=0.7. X is a number between 0 and 1 representing the rank of a member of the group. If a member is 50th percentile, X=0.5. For 95th percentile, X=0.95.

The 80/20 Curve calculates the output of members as the integral between member X_1 and member X_2.

We define

$$q = \frac{\ln R}{\ln(1-R)}$$

where R is the Pareto ratio $(0.5 < R < 1)$, the 80/20 distribution function is:

$$f(x) = q(1-x)^{q-1}, \qquad \forall x \in [0,1]$$

Total output from the left (weak) side of the 80/20 Curve from 0 to x is:

$$A_0(x) = 1 - \exp[q \ln(1-x)]$$

Total output from the right (strong) side of the 80/20 Curve from x to 1 is:

$$A_1(x) = \exp[q \ln(1-x)]$$

This formula enables you to enter small bits of data (mean, average, total output of population or any one member) and predict the rest of the population with startling accuracy. These formulas are used in the 80/20 tool at www.8020curve.com.

Perry Marshall is the author of "80/20 Sales & Marketing" ("Il principio 80/20 per vendite e marketing" in Italian) and "Ultimate Guide to Google AdWords," the world's best-selling book on internet advertising. His talks celebrate Vilfredo Pareto and explore advanced applications of 80/20.

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