

BOOK CLUB SYNOPSIS

The Formula: The Universal Laws of Success

Albert-László Barabási

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INTRODUCTION

SUCCESS ISN'T ABOUT YOU. IT'S ABOUT US

As the head of Boston's Center for Complex Network Research, Albert-László Barabási explores the "why" behind a wide variety of topics, a continuation of his self-proclaimed and lifelong love for tinkering, which has roots in his childhood. In studying success, his team's "goal was to formulate success as a mathematical problem that computer scientists and physicists, using the unforgiving tools of quantitative science, could address in a definite fashion."

Barabási's interest in the topic of success came about after Dashun Wang, one of his Ph.D. students, wrote a paper about how people respond to disaster that was rejected by all of the journals to which it was submitted. It was then that the pair decided to focus on studying success in the area of scientific research, rather than catastrophe. Of this decision, writes Barabási, "In no time, we started seeing patterns in the data, which turned into formulae we could use to *predict future outcomes* for ourselves, our colleagues, and even our professional rivals." The resulting paper, written by Wang, was later published in the prestigious journal *Science*.

Eventually, Barabási and his lab members turned to other fields to see if they could predict success elsewhere. Looking at art, authors, sports, business and more, he writes, "We were suddenly seeing a *series of recurring patterns that drive success in most areas of human performance*." They came to refer to these patterns as the Laws of Success. Drawing from this research, Barabási decided to write *The Formula* as a means of unveiling the team's discoveries about success, which he defines as "the rewards we earn from the communities we belong to." He offered the following caveat: that success as discussed in this book is external and can differ depending on your field.

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CHAPTER ONE

THE RED BARON AND THE FORGOTTEN ACE

The chapter starts out with the military exploits of Manfred von Richthofen, a WWI-era German ace pilot better known as “the Red Baron,” who shot down a record 80 Allied planes in three years. In studying the German ace pilots, Barabási’s team used Google search result numbers to determine popular recognition. Von Richthofen, with 80 aerial victories, was at the top of the list by far when it came to downed planes, but with 392 aces and 5,050 overall aerial victories, his individual record represented only 1.6 percent of the total. “Yet he generated 27 percent of the German aces’ Google hits.”

This would seem to confirm that it was the Red Baron’s performance that equated to success and the attention he continues to earn, even after his death. “Except, then there’s René Fonck,” a French Allied pilot who had 75 confirmed victories, and perhaps as many as 127. He was often the only pilot who returned from missions, and he rarely used more than five bullets to down an enemy plane. By many measures, he was more skilled than von Richthofen, but few people know of him today.

Fonck’s relative obscurity illustrates a foundational principle of success: *“Your success isn’t about you and your performance. It’s about us and how we perceive your performance.”* Success is thus “a collective measure, capturing how people respond to our performance.” Given this collective nature of success, “we have to inspect the social and professional networks that generate collective responses to

individual performances. ... The most successful among us have mastered our networks, using them to achieve a place in the collective consciousness.”

Barabási uses his own story as an example. Expelled to Hungary after his father was purged from the Romanian government, Barabási studied with a scientist, Tamás Vicsek, who had spent years working in the U.S. Through Vicsek, Barabási met Gene Stanley, who then pulled strings to get him to Boston, Massachusetts. “I’m tempted to say that all this happened because I was a promising scientist, that my later success was thanks to my performance alone. But then I think of my peers at the university in Bucharest. Some of them took home the gold in physics competitions I didn’t even *qualify* for.” Networks are what made the difference in Barabási’s life.

In analyzing the recognition disparity between von Richthofen and Fonck, Barabási again points to networks. While von Richthofen served as a colorful character in the German propaganda machine, with his bright red plane and a reputation for being ruthless, Fonck was not as useful to his network. “The Red Baron’s success was about what was happening politically and socially during the war. ... We remember him today because he was once vital to the German propaganda machine. His reputation was left in the hands of those desperate for a hero to galvanize their spirit.” His appearance in *Peanuts* cartoons illustrates another reason he is remembered: his fame.

Barabási asks, “Can we separate success from fame? Do we have to?” Visiting the Nobel Forum in Stockholm, Sweden, he was struck by the fact that he did not recognize a single face among former winners. “Success and fame are very different animals,” he concluded, and accumulated success brings with it name recognition. “Once people become recognizable names outside of their professional networks, to the point that their future performances are secondary to our appreciation of them, we bestow the mantle of *fame*.”

César Hidalgo, one of Barabási's former students, created the Pantheon Project to catalogue the most famous people in the world, living and dead (to qualify, a person must have a Wikipedia page in at least 25 languages). Among them are Jimi Hendrix, Matsuo Basho, Aristotle, Charles Manson, Martin Luther King Jr. and even the Red Baron. Also among them are people like Kim Kardashian, who Barabási identifies as Fonck's opposite: "an unmistakable instance of success without obvious performance." So then, what is the relationship between success and performance?

THE FIRST LAW

Performance drives success—
but when performance is
immeasurable, networks
determine success.

02

CHAPTER TWO

GRAND SLAMS AND COLLEGE DIPLOMAS

WHY HARD WORK (SOMETIMES) WORKS

When Barabási's son applied to college, he was dismayed to learn of the opaque, subjective and unpredictable nature of the college admissions process in the U.S. In response, Barabási asked, "what does it take for our kids to succeed in a world where we lack a clear metric of performance?"

One of his lab members, Burcu Yucesoy, correlated data from the Association of Tennis Professionals, which rigorously tracked and assigned points to professional tennis players, with internet traffic to individual players' Wikipedia pages between 2008 and 2015. She created a formula to predict how much visibility each player should have earned based on their wins and losses. Ultimately, Yucesoy found that traffic to tennis players' Wikipedia pages tracked extremely closely with their athleticism and game performance; in other words, their performance predicted their success.

High school placement test scores are similar predictors of success, notes Barabási. The Boston Latin School, as one of the 20 best high schools in the country, is "public but highly selective," only admitting students who pass an entrance exam. The second-best school in Boston is Boston Latin Academy, followed by the John D. O'Bryant School of Mathematics and Science. Failing admission to those, students must attend a "non-exam" public school. "If you're a parent living in Boston, you'll do everything possible to

ensure your kid lands at one of these exam schools. And if your kid misses the cutoff, it would seem, on the face of it, that you're setting her up for failure."

Yet when economists studied the academic performance of students who did well on the Boston Latin School's entrance exam, they found that actually attending the Boston Latin School, Boston Latin Academy, the O'Bryant School of Mathematics and Science or a non-exam school did not at all correlate with the students' ultimate academic performance on the PSAT, SAT or AP tests. The lesson? *"High achievers continue to excel no matter what education a school offers. ...* In other words, Boston Latin doesn't make your daughter a better student. It's your daughter who makes Boston Latin into the elite school it is." The same principle applies to college students and their post-graduation earning power. Students who were admitted to an Ivy League school did well after college whether they attended the elite university or a less-expensive one.

But what about areas where performance is hard, if not impossible, to quantitatively gauge?

03

CHAPTER THREE

THE \$2 MILLION URINAL

WHY HARD WORK DOESN'T WORK

“SAMO,” a late-1970s graffiti collaboration between Al Diaz and Jean-Michel Basquiat, “offers a kind of ‘twin study’ in art. Two students who are the same age, from the same environment, make art that’s impossible to tell apart. Suddenly they become untwinned, breaking abruptly out on their own. What happens then?” The two artists, one of whom remained relatively obscure while the other became an A-list celebrity, “differed in one essential aspect: Diaz was a loner. Basquiat, on the other hand, was an unapologetic networker.” He built relationships with Andy Warhol, Keith Haring and “Diego Cortez, a well-connected East Village artist.” Cortez featured him in a show alongside Warhol and Haring, launching Basquiat’s career.

“Networks are singularly important” predictors of success in fields like art, “where performance and quality are hard to measure.” Marcel Duchamp’s 1917 work *Fountain*—in fact a factory-made urinal—was perhaps a watershed moment in modern art, as it exposed the subjectivity of fine art. It “illustrates how difficult it is to understand success in areas where quality and performance are inherently absent.”

Working with Chris Riedl and Sam Fraiberger from the Network Science Institute at Northeastern University, Barabási studied the careers of artists in his attempt to determine why some succeeded and others didn’t. “Artists derive prestige from their affiliations

with specific galleries and museums; in turn, the prestige of these institutions stems from the perceived importance of the artists they represent and exhibit. In other words, there's a symbiotic relationship between artists and institutions, and it's based on little more than mutual belief in one another. ... That means that prestige in the art world is as subjective as it is valuable."

Using data from Magnus Resch, a German art historian, and his eponymous app, Barabási and his colleagues built out a network of art institutions, linking them if an artist had shown his or her art at both institutions. "The network's hubs were, without exception, the art world's most influential galleries and museums. ... By showing at major galleries or museums, you're *guaranteed* to be a superstar in the art world." This research also revealed how insular the art world is, with many institutions only sharing art with each other: "most galleries and museums are part of tightly knit communities that are so busy networking among themselves that they hardly connect to the main cluster."

Success in the big-name gallery network "is essentially a feedback loop. ... The dirty but open secret in the art world is that once you've made it, it's in everyone's interest to keep you 'made.'" High prices are used as justification for ever-higher ones in "a pyramid scheme that pushes prices in only one direction. It works because there's no meter to gauge the quality of any given piece, no objective way to measure an object's inherent worth." By looking at whether an artist started out "at the periphery of the network or at its heart," Barabási's team was able to make a relatively accurate prediction of her future success based on her first five exhibits.

Even still, there exist outliers who started on the periphery but were able to make it to the big leagues of the art world. One factor tied these rare individuals together: "a relentless and restless early search. The data showed that these artists avoided the comfortable and common route of exhibiting repeatedly at the same galleries. Instead, they cast a wide net, as the saying goes, reaching outward and showing at institutions of widely varying location and reputation." For these ambitious artists, investing in their social and professional networks was "the secret to their artistic success."

Since “most professions fall somewhere in between” the two extremes of sports and art, “*both* performance and networks matter, to varying degrees,” in the corporate world. “But climbing the corporate ladder isn’t realistic if we can’t prove we’re the best at what we do. Instead, we need to bring the corner office or that prestigious gallery or that hoped-for interview closer to us. How? Replace the corporate ladder with a social bridge. ... If we want to bring the world-up-there nearer to our doorsteps, we need to find the hubs that can accelerate our trajectories and reach out to them.”

THE SECOND LAW

Performance is bounded, but
success is unbounded.

04

CHAPTER FOUR

HOW MUCH IS A BOTTLE OF WINE WORTH?

HOW DO WE DECIDE WHEN WE CAN'T DECIDE?

At high levels of excellence, whether in wine or world-class sprinting, the difference between competitors is often difficult to perceive. In 2005, winemaker and former wine judge Bob Hodgson conducted an experiment at the California State Fair wine competition: each judge was served the same wine three times in a random order, and each judge scored it differently each time they tried it. Usain Bolt, “the fastest man on earth,” is only 1 percent faster than his next-fastest competitor. Both examples provide evidence that *“performance is bounded.”*

Using standard distribution models (bell curves), we can even predict future performance. Filippo Radicchi, a researcher at the University of Indiana, did just that in sprinting records, predicting Usain Bolt’s 2012 Olympics performance of 9.63 seconds in the 100-meter dash, as well as very nearly predicting Shelly-Ann Fraser-Pryce’s time of 10.75 seconds. (Radicchi was off by 0.02 seconds in the latter case.) The lesson? “All of us at the top will find ourselves repeatedly bumping up against the same bounds in performance. Which raises an important question. If we’re surrounded by excellent competitors, how do we distinguish the best from the best? How do we decide when we can’t measure?”

In the wine competition, Hodgson discovered that there was no consistency among judges’ taste from year to year, although about 10 percent were consistent within the same year. “The data is clear. The gold medals attached to bottles in wine stores are based on

junk science. I'm not implying that prizewinning wines are bad. To the contrary—they're all *excellent*. And that's precisely why winning a wine competition comes down largely to chance."

In another example, both novices and expert judges were asked to predict the winner of a classical music competition. One group only heard audio, another had both audio and video, and the last only saw video. "Surprisingly, the group best able to pinpoint the winner consisted of those who watched the video with the sound off," guessing correctly about 50 percent of the time compared to the audio group's 25 percent. "*Those who couldn't actually hear the music did twice as well as those who did.* The experts did no better than novices at identifying the most deserving performer, and in some cases they did *worse*." Barabási concludes, "If the music research tells us anything, it's how important the unspoken aspects of our self-presentation are."

Lacking hard data to fall back on, we are all subject to biases: gender bias, familiarity bias, immediacy bias and recency bias, to name a few. No competition is immune, writes Barabási, citing examples from the Eurovision Song Contest to professional figure skating. "Scores systematically increase according to a [competitor's] position in the roster. Those who compete later appear—miraculously, consistently—to [do] much better."

In light of these findings, Barabási encourages students interviewing for jobs to interview as close to the hiring deadline as possible. "The final candidate walking through the door very likely won't answer questions better than the guy before him. *The questions he's asked are better*, informed by the interviews that came before, just as a judge hones her ear with each iteration of a concerto performed for her."

In Spain, aspiring courtroom judges are orally examined by a panel of experienced justices; being examined on Monday predicts a 50 percent pass rate, but on Friday, their chances go up to 75 percent. In the U.S. Food and Drug Administration approval process, a medical device's approval often hinges on who speaks first—and how they frame the discussion and what questions get asked—which is determined based on how people are seated around the table.

“In many ways, the boundedness of performance sets most competitions up for failure, forcing judges to decide not between good and bad, slow and fast, or experienced and novice. Rather, they’re asked to choose among people who all nudge the upper limit of performance in their fields.” This leaves outcomes up to arbitrary factors, such as timing, gender or appearance—or pure chance—far more than most people would probably think or be comfortable with.

While many of these factors are beyond our control, “success is often a numbers game” and “just as you need to buy multiple tickets to widen your odds of winning the lottery, you’re far more likely to score a preferred spot on the roster if you keep showing up. The good news is that once you get that first win, the data shows you’ll win again and again. *There’s a secret, mindlessly metastasizing aspect to reward.*”

05

CHAPTER FIVE

SUPERSTARS AND POWER LAWS

THE REWARDS ARE LIMITLESS

When considering the long-term dominance of lauded golfer Tiger Woods, “it’s tempting to conclude that Woods is a rare exception whose performance isn’t bounded.” The reality is that while he is certainly at the upper bounds of the bell curve, he has not always objectively had the best stats. “But while Woods’s performance is clearly bounded, his *success* is limitless,” from his (at the time) largest-ever five-year \$105 million deal with Nike to his \$1 billion net career earnings.

“Woods is what economists call a *superstar*, someone exceptionally rewarded for exceptional performance.” Despite having marginally better performance, a superstar’s success is often exponentially greater than that of the competition. For example: In October 2009, *The New York Times* best-seller was Dan Brown’s *The Lost Symbol*, followed by Nicholas Sparks’ *The Last Song*. That week, Sparks had sold 120,000 copies to Brown’s 1.2 million. Barabási considers it unlikely that *The Lost Symbol* was actually 10 times better written than *The Last Song*. “The difference in their sales has nothing to do with performance, but shows how limitless success can be.”

While performance can be modeled in a bell curve, success follows a power law distribution, which explains, for example, how the eight richest people in the world can have more combined wealth than the bottom 50 percent. “Power law distributions have slowly decaying tails, meaning that they allow for a few exceptionally large

outcomes, extremes that would be impossible in a bell curve.” The economic definition of superstardom may make it seem completely out of reach, “but power laws facilitate a broadening of our definitions of success.”

Nobel Prize winner “Steven Weinberg is the best-paid physics professor in history.” In 1982, when the University of Texas at Austin tried to poach him from Harvard University, he asked for a salary to match the football coach’s. In 1991, he was making around \$250,000 a year, an astronomically high sum for physics professors, but only about five times the average, illustrating an important principle: “To be a superstar economically ... your performance must scale.” Today, the football coach at UT Austin makes more than \$5 million a year, while Weinberg earns \$575,000. The difference? The coach’s efforts scale broadly across all of the football team’s fans, whereas Weinberg’s reach is limited to the several hundred students he teaches.

“Yet Weinberg’s case perfectly illustrates how limited the economic definition of superstardom can be. The truth is, Weinberg *is* a superstar if the metric we use is scientific impact.” The paper that earned him a Nobel Prize has been cited an astounding 14,000 times, a currency of its own; each citation is estimated to be worth \$100,000, based on the total amount of funding spent on research.

Even in fields where performance is hard to quantitatively measure, like pop music, success follows a power law. And importantly, it tends toward inequality. “In 1982 ... the top 1 percent of pop stars took home roughly a quarter of concert ticket revenue. Now [Justin] Timberlake and his fellow top-twenty hit makers rake in more than half of that purse.”

“Competition is good for us,” we’re often told; it pushes us to perform better, making us “sharper, more disciplined.” But data collected by economist Jennifer Brown shows that “competing against a superstar has the opposite effect: It *measurably lowers our performance*.” We see this in the phenomenon called the Tiger Woods effect: “Highly ranked players’ first-round scores were, on average, 0.6 strokes higher (meaning weaker playing) when Woods was present than they were when he was absent.” When Woods took

time off for multiple knee injuries, and in the wake of his very public divorce, his top-ranked competitors played on average 4.6 strokes better.

Yet there are benefits to working with superstars: “*Superstars suppress you if you compete against them, but they may boost you if you cooperate with them.*” Superstar scientists boost department productivity when they are hired. “After a superstar’s death, the collaborators’ productivity drops 5 to 8 percent,” illustrating that superstars influence both through their presence and in their absence.

The good news: “If we know that performance is bounded, we can remind ourselves that we’re capable of besting superstars. The subtle psychological factors that diminish our performance in the presence of luminaries are less powerful if we’re aware of them.” When Woods was playing exceptionally well, the Tiger Woods effect was strong; when he was “cold,” it all but disappeared. Barabási advises remembering that superstars are not infallible. “*Hopelessness*, not superstars, is what’s so defeating.”

THE THIRD LAW

Previous success x fitness =
future success.

06

CHAPTER SIX

EXPLODING KITTENS AND SOCK PUPPETS

HOW TO KICK-START YOUR SUCCESS

Exploding Kittens, a card game originally crowdfunded through Kickstarter, reached its goal of \$10,000 in eight minutes. At the end of the monthlong funding period, it had raised \$8.8 million. What explains its success when 70 percent of Kickstarter projects fail? Sociologist Arnout van de Rijt conducted an experiment in which he donated small amounts to random Kickstarter projects, finding that “those who received his initial donation *more than doubled* their chance of attracting further funds.” His research seems to substantiate the old adage that success breeds success. Barabási termed this phenomenon, “preferential attachment.”

In 1998, he and his team found that websites received more traffic when they were linked to by other sites, which in turn, increased the number of sites that linked to them, growing their popularity. Similarly: “The more clients a real estate broker has, the more referrals she’ll get. ... An actor will continue to land roles if he’s in a film that wins applause.” And preferential attachment also explains disparities in educational achievement: “A child unaccustomed to books will likely not read much as he gets older. ... Preferential attachment, then, expands the divide between the educational haves and have-nots, a phenomenon that continues to snowball over a lifetime.”

This leads to another line of thinking: “What if preferential attachment is rooted to something even more fundamental: variations in talent or privilege, or the inherent social advantages a fortunate person is born with? That is, do those who repeatedly win do so because they are simply better or because they have consistently deeper resources?” Van de Rijt tested this hypothesis, awarding virtual commendations (Barnstars) to a random set of Wikipedia’s most active 1 percent of editors. *“The people who received a first, random Barnstar from Arnout became ‘awardable.’ They were far more likely to receive a second or third one from somebody else.”*

Barabási has demonstrated this effect in science and classical music; van de Rijt has demonstrated it with Change.org petitions, proving that even in matters of ideological importance, preferential attachment applies. “A lot of petitions come through my Facebook feed, on a lot of varied topics. On rare occasions I sign them, usually when the issue at stake is one that I find particularly compelling. ... That’s a decision that feels personal and private. But only the popular causes reach my feed.”

Some use the principle of preferential attachment to “sockpuppet,” using an assumed identity to praise their own work or criticize their competition in an attempt to gain an advantage. While praise—even self-praise—can and does attract further praise, arbitrary negative feedback tends to get cancelled out. “In the virtual universe, the Tinkerbells, scattering fairy dust Arnout-style, are more powerful than the sockpuppeteers.”

Next, van de Rijt set out to answer the question, “How many kicks does it take to kick-start something?” In subsequent experiments on Kickstarter, he found that multiple donations increased the likelihood of success even more than a single one, but there were diminishing returns with subsequent donations, placing even more significance on the first push.

“Yet instead of endorsing unknowns and underdogs, we too often choose the superstars in our networks. *That’s* the mechanism

behind wealth inequality and unbounded success. Preferential attachment explains why life isn't fair. To even the playing field, we need to find ways of recognizing, acknowledging, and championing talent early to set the snowball of achievement in motion."

As it turns out, the creators of Exploding Kittens found a way to kickstart the effects of preferential attachment: involving someone who already had wide influence. Matthew Inman, founder of popular web comic *The Oatmeal*, provided the illustrations for the cards. "[Co-creator Elan] Lee primed the game for success by collaborating with a 'hub,' a person with a substantial following already. ... It was Inman's fan base that catalyzed the funding process as soon as the Kickstarter page went live."

07

CHAPTER SEVEN

THE EAR OF THE BEHOLDER

HOW QUALITY DEFIES SOCIAL INFLUENCE

In April 2013, Robert Galbraith's debut novel, *The Cuckoo's Calling*, was released; it initially sold 500 copies—a failure. Then it was revealed that Robert Galbraith was actually a pseudonym of J.K. Rowling, author of the *Harry Potter* series. *The Cuckoo's Calling* quickly became a best-seller. Without Rowling's name attached, how could the publishers that passed on *The Cuckoo's Calling* have picked it out as a winner? “Homing in on excellence is harder than we think. ... How can someone curate only the best?” Often, we listen to the recommendations of others.

The founders of Yahoo's MusicLab performed an experiment exploring the question of “how popularity influences success.” They sorted 14,000 young Americans, most of them not yet in their mid-20s, into nine virtual rooms, and asked them to rank 48 songs from best to worst. Individual downloads were used to measure which songs were considered best. In eight rooms (one was the control), participants could see how many times each song had been downloaded. Once a top song emerged, it stayed at the top, showing the effect of others' taste on our own. And the top song was different from room to room.

In the 1960s, an “experiment took place at the Oak School, an elementary school in a lower-middle-class neighborhood in San Francisco.” All students from first to sixth grade were given a test, and teachers were told the names of those who scored in the top

20th percentile. At the end of the year, the same test was given, and the top 20 percent performed exceptionally well. One small problem: The list was random. It's an example of what is commonly called a self-fulfilling prophecy: "The teachers expected brilliance from the selected kids, so they encouraged brilliance. The children responded by *producing* brilliance."

But if we reward what other people recommend and success begets success, how can we explain the meteoric rise of newcomers that quickly surpass more established competitors—like Google or Boeing? "They found success because their products had unique, intrinsic qualities that helped them overcome the handicap of their obscurity." Barabási calls "a product's inherent ability to out-compete other products" its "fitness." His Third Law demonstrates that "if two nodes have the same fitness, the older nodes still have an advantage. ... Yet, if two nodes have the same visibility, their fitness difference alone decides who will glean more links."

When the MusicLab researchers revisited their experiment, they inverted the numbers so that the least downloaded song from the control group appeared to have the most downloads, and vice versa. The experiment found that "the flipped billboard was lethal for the good tracks, and bad songs benefitted from the inversion." But, Barabási notes, "In rare cases, *exceptional fitness can defy social influence*." One song, for example, rose to the top despite starting at the bottom, illustrating how "strong performance can recover from adverse social influence and rise in triumph." Preferential attachment works in combination with fitness to influence outcomes: "*Crowds can push the merely good to unearned fame, but they'll rarely get wholeheartedly behind the terrible.*"

How can we disentangle true value from perceived value, especially when popularity is so often used as a proxy for quality? That's something network scientist Manuel Cebrian set out to do with the MusicLab's experiments, eventually arriving at an algorithm for determining a song's fitness divorced from its popularity. When teenagers were shown a list of songs ranked by fitness rather than popularity, total downloads surged by 40 percent. Cebrian could even predict which songs would become hits. Dashun Wang,

Barabási's former student, found similar results on Amazon: "*The more ratings a product had, the more its final rating differed from its true fitness.*" The effect of social influence increased with the number of reviews.

"In the end, if something really matters to us, there are no shortcuts. We need to invest the time and *make our own choices*, independent of the crowd." To apply the Third Law in your workplace, "Instead of doing a 'show of hands,' ... have people vote privately, via e-mail, on issues of importance." You are more likely to get honest feedback when "your colleagues step out of the herd" and make decisions independently.

"When performance is measurable or discernable, it drives success. Working in tandem with popularity, fitness guides our choices in the long run." But "the long run" takes time, as *Harry Potter* illustrates: In the U.S., it took almost a year to reach the top of *The New York Times* best-seller list, but once there, it stayed at the top for nearly 18 months. The success of Ben & Jerry's ice cream also illustrates the Third Law, demonstrating the importance of both fitness (a delicious product) and preferential attachment (kick-started by giving away free cones), while pointing to a third element: teamwork.

THE FOURTH LAW

While team success requires diversity and balance, a single individual will receive credit for the group's achievements.

08

CHAPTER EIGHT

KIND OF CONVENTIONAL, KIND OF INNOVATIVE, KIND OF BLUE

THE IMPORTANCE OF BALANCE, DIVERSITY, AND LEADERSHIP

There is wide agreement that Miles Davis's *Kind of Blue* is a masterpiece. "Since its initial release in 1959, it's been rereleased 118 times," but "most importantly, [it] defined jazz for generations as a point of entry, a source of continued inspiration, a gold standard." How it came to be the masterpiece that it is, however, is a trickier question.

Brian Uzzi, a professor at Northwestern University's Kellogg School of Management, began studying the science of teams by examining the success of Broadway musicals. "In studying the creative networks behind every Broadway production, he located the sweet spot for team success." Uzzi found that it's not the stars who determine success but six other people: "a composer, a lyricist, a librettist, a choreographer, a director, and a producer. They work in tandem to build the story, music, and dance elements; they choose the actors and the venue."

Of more than 474 musical productions, "only 23 percent made money"; the ones that did illustrated that "a hit requires both convention *and* innovation." For instance, when Richard Rodgers and Oscar Hammerstein II adapted Ferenc Molnár's play *Liliom* for their musical *Carousel*, they moved the setting from Budapest, Hungary, to Maine and introduced love songs before the main characters even met. The result was a hit.

In their partnership, Rodgers could be cynical, while Hammerstein tended toward the saccharine; together, they balanced one another. Yet Uzzi found that their musicals did not do as well if the other members of the creative team were as close as they were; likewise, if “teams were too loosely linked, they struggled to produce crowd-pleasing material.” Success “requires a careful balance between convention and innovation, which is best offered by a specific mix of collaborators.” That same balance between conformity and diversity boosts the success of teams that produce jazz tunes and develop video games.

“Multiplicity—of newcomers and incumbents, tried-and-true friends and distant acquaintances collaborating for the first time—is crucial for team success. ... But diversity is not enough. The strong bond aspect is equally crucial.” Yet what about leadership? As the leader of his lab, Barabási asks, “How much is our success about my letting everyone improvise freely? How assertive should I consider my own role?”

Jim Bagrow’s research addresses these questions. He studied the informal teams that arise on GitHub, a code repository and social platform that allows coders to discover and collaborate on projects. Measuring a team’s success in terms of followers, he found that “working in teams had clear advantages. Team projects were much more successful than solo projects. The larger the team, the more followers it had.” Comparing individual team members’ contributions, Bagrow also found that there was often one person doing the majority of the work and that the larger the team, the more that individual worked. And the leader’s level of engagement “played a key role in the team’s success. ... *The more [teams] were dominated by a single leader, the more successful they were.*”

William Muir, a chicken farmer who studies animal breeding, sought out to test the effect of grouping together exceptionally productive hens. After six generations, he presented the results of his experiment: The control group was healthy and had increased egg production by 160 percent. The superhens were the exact

opposite: Only three out of nine hens were alive, and they were both unhealthy and unproductive, the victims of their own infighting.

Muir's experiment illustrates why "all-star" teams are set up to fail: "When we handpick for talent, prioritizing individual accomplishment over team achievement, we rarely get the results we hope for." The same result is seen in professional sports and academic departments, where many individually talented people are grouped together on one team. "Derailed by a desire for dominance, no one can focus on the task at hand."

Carnegie Mellon University researcher Anita Williams-Woolley sought out to see if she and a team of colleagues from MIT could measure collective intelligence—i.e., "Could they measure the intelligence of a group of people working together?" They found that team members with high IQs didn't do better on the team, nor did motivation level make a difference in outcomes. "What *did* matter was how the test subjects communicated. First, teams tended to do well if individuals in the group had higher than average abilities to read emotional cues. Second, groups where a few people dominated the conversation had a lower collective intelligence than those with more equality among group members. ... The third key factor was a fascinating offshoot of the other two: Teams with female members had higher collective intelligence."

The takeaways here are simple: "*Successful teams require balance and diversity. But they also need a leader.*" And both are equally necessary. "For a team to succeed, it's not enough to have the 'best' individual team members. ... What matters is that people are offered opportunities to build rapport and contribute in equal measure." Sandy Pentland, a researcher at MIT's Media Lab, found direct evidence of this in studying a bank's call center. He found that productivity improved most when employees could casually chat, even to the point that "managers should *encourage* side chat and back-channel conversations during meetings."

And “perhaps most importantly for managers and administrators interested in maximizing teamwork, the researchers consistently found that making people aware of their communication dynamics leads to measurable improvements. By mapping the network of interactions visually, bosses might realize that they’re dominating meetings, introverted employees can realize that they’re not stepping outside their comfort zones, and team members can recognize they’re not using one another thoughtfully.”

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CHAPTER NINE

THE ALGORITHM THAT FOUND THE OVERLOOKED SCIENTIST

IT'S ABOUT PERCEPTION, NOT PERFORMANCE

How do we decide who gets credit for a team success? For instance, “how does the Nobel Committee decide whom, among myriad contributors, to honor with a prize,” especially when the majority of breakthroughs are made in research performed by large teams? Hua-Wei Shen, a computer scientist and member of Barabási’s lab, created an algorithm to predict Nobel credit allocation with stunning accuracy. The rare exceptions were cases that had stirred up controversy at the time. For 2008, the algorithm predicted a scientist named Douglas Prasher, who was the first to clone GFP, a protein that acts as a “tiny flashlight that researchers can attach to any protein” to track them with great accuracy. GFP is now an indispensable tool in molecular biology. So why didn’t Prasher get the Nobel Prize?

Shen’s algorithm used research citation patterns to predict who got credit. “If a scientist was key to an insight, his prior work was likely connected to it. ... [We] found that if we traced the career path of each member of a scientific team, we could accurately pinpoint the presumptive ‘owner’ of a given discovery, which was almost always the researcher with the most consistent track record in that area.” The algorithm was successful because it was able to detect “how peers in the discipline paid attention to the work of some of the coauthors and ignored the work of the others.” This accuracy led to the insight: “*Credit for teamwork isn’t based on performance. Credit is based on perception.*”

The English language reinforces our tendency “to focus on individual accomplishment over team achievement, to seek unique faces or heroes” to associate with major works—e.g. “Darwin’s theory of evolution, Freudian psychoanalysis ... or a David Lynch TV series.” Given that “credit allocation is guided by the same rich-get-richer phenomenon we see in every other area of success,” Barabási warns, “that means that there are dangers to collaborating.” Working with a big name can help build your resume and open up your network to great opportunities, but you run the risk of having your work credited to someone else. “In other words, too much time spent in someone else’s shadow eclipses our contributions.” What’s a better approach? “Stake a claim in uncharted territory” or strike out on your own.

That’s what Darlene Love did. The voice behind beloved classics “Christmas (Baby Please Come Home)” and “He’s a Rebel,” she had signed “a deeply exploitative contract with producer Phil Spector” that used her voice to benefit others but left her languishing in obscurity. In the early 1980s, lacking much of a support network or any real black female music stars as role models, she became determined to make it on her own terms, slowly gaining small successes—an appearance on David Letterman, an acting role in *Lethal Weapon*—before singing a duet with Bette Midler and releasing solo albums. “By stepping into the spotlight and utilizing the relationships she’d built in the industry, she made sure that each of her projects could be directly linked to her.” At age 69, she was inducted into the Rock and Roll Hall of Fame.

The credit allocation gap can be seen in many professions in the form of gendered pay, since “earnings are one of the most tangible ways that our society allocates credit.” And among economics professors seeking tenure, “The data shows that women who exclusively work alone are just as likely to receive tenure as men. Regardless of gender, every solo paper an economist writes increases his or her chances of tenure by 8 or 9 percent. Yet a gap suddenly appears once a woman team-authors a paper, and the chances only widen with each collaborative project she participates in. Instead of

increasing her odds, every team-authored paper she contributes to *lowers* them.” Male professors, meanwhile, “pay no price for collaborative work.”

Ultimately, Prasher didn’t receive a Nobel Prize because two other scientists, with whom he shared the cloned GFP gene and who used it in innovative ways, “became the face of GFP.” For Barabási, “the Fourth Law isn’t about missed opportunities or credit not allocated. Instead, the discovery offers me actionable insight into how reward is doled out by our society. ... Credit is often assigned, as the First Law Dictates—by invisible networks, not by individual arbitrators. Above all, the vast and fluid tangle of relationships we’re embedded in determines our success.”

THE FIFTH LAW

Success can come at any time as
long as we are persistent.

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CHAPTER TEN

EINSTEIN'S ERROR

WHY HARD WORK, COMBINED WITH SKILL, WINS IN THE END

Albert Einstein believed groundbreaking discovery was the domain of the young: “A person who has not made his great contribution to science before the age of thirty will never do so,” he said.” Barabási disagrees, asserting that “*creativity itself has no age*” and that “we can have a career-defining breakthrough at any moment.” With his lab member Roberta Sinatra, Barabási looked into the relationship between age, success and creativity in non-superstar careers. They started “with a simple question: At what stage in our careers do we [research scientists] write our highest-impact paper?”

After two years spent analyzing the careers of thousands of scientists responsible for 40 million publications, they concluded: “Successful research typically came relatively early in a career—within the first two decades after starting out in the field. To be precise, it appeared that a scientist had roughly a 13 percent chance of publishing her highest-impact work in the first three years of her career. And about the same odds held true for the following three years. ... But, after twenty years, something changed, and her odds sank dramatically.”

But this is not the whole story: The chances of a breakthrough dropped with age, but so did productivity, tracking to the point that the two were hard to distinguish. Sinatra and Barabási's breakthrough came when they started to analyze retired scientists,

not dead ones. They arranged papers in chronological order rather than tagging them by the author's age. Each paper had the same chance of being the most important, regardless of age. Productivity then became the explanation for peaking early.

That explains how John Fenn earned the Nobel Prize in Chemistry in his mid-80s; even after being forced to retire at 70, he continued to work on his prize idea. “Fenn embodies the Fifth Law’s simple message: *Your chance of success has little to do with your age. It’s shaped by your willingness to try repeatedly for a breakthrough.*”

In addition to tenacity, you need something Barabási calls the Q-factor. “A terrific idea in clumsy hands rarely leads to an important outcome. Your *ability* to turn an idea into a discovery is equally important, and that varies dramatically from person to person.” That ability is the Q-factor, part of an equation: $S = Qr$: Success equals the value of one’s random ideas (r) times one’s Q-factor.

And Q-factors remain unchanged as a person ages and gains experience. When Onur Varol, a member of Barabási’s lab, looked at Twitter, he found “that some were much more talented at engaging with their audiences than others.” There are those who can put out tweets that resonate with their followers and those who can’t; over time, follower count changes, but the ability to create engaging tweets doesn’t.

For those with seemingly low Q-factors, the explanation may be that you’re in the wrong field. “The point is that if our Q-factor isn’t resonating with our job, we must take a moment to decide if we’ve pinned our hopes on the wrong career path. Once you find ... that area or profession where your Q-factor shines, there’s really only one more thing you need to do: Not give up.”

It’s important to note that success, however, does have limits. “As happens with so many things in life, success is limited by time. ... Success wanes because *everything ages*, falling victim to an ‘attention economy.’” The key, therefore, is to keep creating: “Let the qualities that give you your Q-factor do their job by giving them a chance to

deliver success over and over. Successful people engage in project after project after project. They don't just count their winnings; they buy new lottery tickets."

Collaboration is another way to exploit your Q-factor. "Harness your network to help you with your projects. If nothing else, this prompts you to keep trying, to keep taking your Q-factor for a ride. Teamwork motivates us."

CONCLUSION

Barabási points to Einstein's life as a perfect case study to illustrate the five Laws of Success at work. "But he's not alone. The paths to success for anyone you can think of, from Paris Hilton to Mick Jagger to Nelson Mandela, hinge on these laws. That's because they're universal." And like all scientific laws, the Laws of Success are immutable: "We can't alter them, but we can use them to evaluate when performance is sufficient for success and when it isn't. The lessons we can extract from these laws will help us find a balance, deciding how much effort we should devote to honing our skills vs. networking, assessing how credit will be allocated on projects we're involved in, and strategically choosing collaborators to boost creativity."

In addition to using the Laws of Success to improve our own personal and professional outcomes, Barabási calls for us to "use our awareness of the mechanisms behind success to create a more equitable society. How? By kick-starting the success of the many deserving people around us. ... By recognizing that there's more to success than simple performance, we can assist hopeful up-and-comers with an arsenal of practical strategies."

Throughout history, Barabási concludes, millions of people have hoped to achieve success through "self-help tropes" or by "praying for a lucky windfall" without realizing the foundational principles at work. "Everyone from Martin Luther King Jr. to the Beatles to Einstein were, for all their genius, ignorant of the laws that skyrocketed the exceptional notoriety they received. We, now, are not. And that just might be the crucial advantage we can use in our quest to join their lofty heights."

About World 50

World 50 is the premier resource for senior executives from globally respected organizations to privately and candidly share ideas, solutions and collaborative discovery.

The World 50 community provides unrivaled access to and collaboration with more than 1,400 senior executives from 700 globally respected organizations on six continents. Membership provides unparalleled access to world-class gatherings as well as year-round peer-to-peer and team-to-team collaboration, delivering insights found nowhere else. Intimate participation with remarkable peers and guests creates a candid dialogue on leading and growing significant enterprises in a global economy.

About the Author

Albert-László Barabási is the Robert Gray Dodge Professor of Network Science and a Distinguished University Professor at Northeastern University. He is the author of multiple books, including *Bursts: The Hidden Pattern Behind Everything We Do* and *Linked: The New Science of Networks*. Having been awarded the FEBS Anniversary Prize for Systems Biology, the John von Neumann Medal for outstanding achievements in computer science and technology, the C&C Prize from the NEC Foundation, the Cozzarelli and Lagrange prizes, as well as the Senior Scientific Award of the Complex Systems Society, his work has been recognized by a number of prestigious institutions and has led to many scientific breakthroughs, such as the discovery of scale-free networks.

