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Trouble for Hedgehogs

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"The fox knows many things," the ancient Greek poet Archilochus wrote, "but the hedgehog knows one big thing." This pithy characterization of the battle between generalists and specialists, between breadth and depth, that has raged for centuries formed the basis for Isaiah Berlin's landmark 1953 work *The Hedgehog and the Fox*, which pitted hedgehogs like Plato, Dante, and Nietzsche against foxes like Aristotle, Shakespeare, and Goethe.

In *Range*, David Epstein, a contrarian journalist who describes his own polymathy in foxlike terms, skillfully updates Archilochus' and Berlin's dichotomy for the twenty-first century. Epstein comes down decisively and persuasively on the side of the generalists, and expounds on the urgent need for members of the modern workforce to channel their own foxlike instincts. His broad survey of an extraordinary variety of fields—ranging from psychology to sports to bioengineering to comic books to music to physics—reveals a consistent truth beginning to emerge at an especially fraught moment in the professional evolution of the Western world, which "increasingly incentivizes, even demands, hyperspecialization." To wit, only those who branch out, who read and study widely, who make connections between fields, and who think and hypothesize and collaborate unconventionally will gain purchase in our progressively automated post-industrial society.

Range: Why Generalists Triumph in a Specialized World
By David Epstein
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Epstein begins by comparing the early training trajectories of sports legends Tiger Woods and Roger Federer. While Woods began his golf training at seven months old, famously shot eleven over par at age three, and went on to reach golf's Pantheon, Federer dabbled in basketball, wrestling, swimming, soccer, and other sports, and only toward his teens began to focus on tennis, where he, too, would take his place among the greatest.

Through this dichotomy, Epstein sets out to debunk or at least delimit the famous 10,000-hour rule, popularized in Malcolm Gladwell's *Outliers*—that only through intensive, sustained, single-minded practice can one truly excel in a field. (Gladwell has previously tangled

with Epstein on stage, but offers a glowing blurb for the book: "For reasons I cannot explain, David Epstein manages to make me thoroughly enjoy the experience of being told that everything I thought about something was wrong.") Epstein considers it a myth that the kind of dedicated practice Gladwell recommends can profitably be applied outside specific athletic contexts, or realms like chess. Borrowing from psychologist Robin Hogarth, he characterizes these as "kind" learning environments, in which people benefit from repetitive patterns, a finite (if large) number of scenarios, and near-instant, accurate feedback.

By contrast, only experimentation and variation allow us to thrive in "wicked" environments, which are not as congenial to repetition and reward. In these environments, sampling different interests "is not incidental to the development of great performers—something to be excised in the interest of a head start—it is integral."

Consider one of Epstein's fascinating examples: the seventeenth-century Venetian *figlie del coro*, "daughters of the choir." A motley crew of orphans, children of women of ill repute, and other societal castoffs had been brought together in the city's *Ospedale della Pietà*, essentially an orphanage functioning as a music school. While the girls learned to read and write and acquired vocational skills, they also studied music, especially in the wake of a plague in 1630 that exterminated a third of the city's population and stoked a renewed fervor for religious melody. A wickeder environment would be difficult to conjure.

Yet the girls' musical instruction was both varied and reasonable. They learned to play everything from violins to harpsichords to double-basses, and rehearsed only about an hour each day. This diffusion of skill, Epstein contends, "enabled musical experimentation so profound that it laid a foundation for the modern orchestra." Composers like Vivaldi, Haydn, and Mozart either composed music for the *figlie* or heard them perform. Far from inhibiting musical greatness, leading musicologists believe, the diverse, balanced instrumental regimen of the *Ospedale* facilitated it, in no small part because it enabled the "daughters" to select the instrument they most enjoyed playing.

A July article in the *Atlantic* by Jerry Useem provides a nice set of complementary examples. Useem describes the time he spent aboard the San Diego–based USS Gabrielle Giffords, a new combat ship capable of converting from minesweeper to combatant to submarine hunter—and, we might add, may before long help launch coordinated land, air, and sea attacks by thousands of small drones. Like the ship, its crew—its "most futuristic aspect," Useem writes—also reflects the

increasingly broad, flexible nature of naval warfare, with boatswain's mates doubling as chefs, crane operators, and helicopter-salvage coordinators.

In a simulation of the wicked environment of maritime combat vessels, Useem underwent a typical recruitment test that required him to monitor and perform four separate tasks at once on a single screen, which he struggled to do. Actual recruits had to notice moments when one task would come to account for most of their total score, and shift their attention accordingly. The recruits who thrived, perhaps counterintuitively, were those who did *not* partition their focus equally among all four tasks, as conscientious applicants who blossom in "kind" environments might. Instead, the more distractible—those who not only can multitask but can selectively ignore less pressing tasks—are the naval success stories of the future.

As praiseworthy as distractibility: Struggling to integrate a new set of skills the first time around. "For a given amount of material," Epstein posits, "learning is most efficient in the long run when it is really inefficient in the short run." He cites research showing that subjects—both simian and human—who did not receive immediate help with difficult problems outperformed, over time, subjects who did receive help. Initial failure, for example in answering a question, can help in the long run for remembering the correct answer once a student hears it. As cognitive psychologist Nate Kornell explains, "some people argue that part of the reason U.S. students don't do as well on international measures of high school knowledge is that they're doing too well in class. What you want is to make it easy to make it hard."

One useful educational approach is directed to solving problems that involve making connections. For example, we were skeptical when our children were first introduced to what my wife and I considered the perplexing notion of Singapore Math, which relies on the "intentional sequencing of concepts," or the slow-learning notion that each level of mathematical abstraction must first be mastered before newer ones can be introduced. For example, an instructor would teach an addition problem about apples by handing students actual apples for them to count up. Once students master this "concrete" stage, the instructor depicts the problem pictorially, by drawing apples on a blackboard, then finally moves on to using mathematical symbols. Older modes of teaching—memorizing multiplication tables and order-of-operations acronyms like "Please Excuse My Dear Aunt Sally"—felt familiar and comforting. And so we all struggled to grasp this new approach, often leading to frustrating evenings huddled over homework and

dispiriting test results. But gradually, the Singapore model helped our children, as promised, to "develop number sense and flexibility in thinking about numbers." By connecting pictorial, verbal, and abstract concepts, they honed their skills considerably.

Ultimately, the purpose of this connection-making methodology is to empower children to flourish in the world *outside* of school, where the controlled, kind environment gives way to more wicked terrain. And here, Epstein posits, nothing so new-fangled as Singapore Math is necessarily required. We might turn instead to the ancient model of Socrates, who "forced pupils to generate answers rather than bestowing them," which "requires the learner to intentionally sacrifice current performance for future benefit." Slow, arduous, painful learning not only enhances the effectiveness of the educational experience for children but also equips them to handle complex, painful situations in their future professional lives where they will have to draw connections across divergent realms of knowledge.

Research further shows that we may even benefit from quitting. Directly tackling Angela Duckworth's hugely influential theory of grit, Epstein shows that attaining "match quality"—ensuring our vocations and avocations correspond to our interests and talents—far exceeds tenacity in predicting professional success and satisfaction. He unpacks Duckworth's famous study of the West Point "Beast" hazing ritual, which found that the likelihood of freshmen sticking with the program was better predicted by their grit—a combination of resilience and "consistency of interests"—than by standardized test scores and physical fitness. Instead Epstein concludes that, in the long run, many of those who dropped out suffered not from a dearth of stick-to-it-iveness but simply came to recognize that the military wasn't a good fit for them. "In the wider world of work," Epstein argues, "finding a goal with high match quality in the first place is the greater challenge, and persistence for the sake of persistence can get in the way." As the Olympic figure skater Sasha Cohen wrote in a 2018 column, grit is essential in sports, where you try to attain "a single overarching goal every day," but life isn't like that.

One of the most important lessons Epstein articulates and flavors in different ways is the value of broadening one's perspective, known variously as lateral thinking, analogizing from diverse contexts, or the cliché "thinking outside the box." The most creative and effective problem-solvers, Epstein argues, will draw on experiences outside of their comfort zones, whether through interdisciplinary study or through collaboration with experts in other fields.

He cites the remarkable statistic that Nobel laureates in the sciences

are "at least twenty-two times more likely to partake as an amateur actor, dancer, magician or other type of performer" than their fellow scientists. They are also more likely than other scientists to practice art, music, and crafts.

In a 1990s study, psychologist Kevin Dunbar monitored four molecular biology labs over the course of a year, paying particular attention to their weekly meetings. He concluded that those labs "in which scientists had more diverse professional backgrounds were the ones where more and more varied analogies were offered, and where breakthroughs were more reliably produced when the unexpected arose." Why did foxlike scientists consistently outperform their hedgehogish rivals? Because, Dunbar found, "when the moment came to either dismiss or embrace and grapple with information that puzzled them, they drew on their range to make analogies. Lots of them."

At times, *Range* leans too heavily on the power of anecdote. For every late-blooming van Gogh, whose story of repeated, prolonged failure followed by a brief and intense efflorescence of stunning success Epstein recounts with aplomb, there are dozens of nobodies who've bounced from job to job without accomplishment. And for every Gunpei Yokoi, the visionary Nintendo engineering generalist who fashioned the legendary Game Boy out of "lateral thinking with withered technology," there are a dozen electronics specialists who executed his vision. As much as these stories illustrate Epstein's thesis and leaven his prose, they go only so far in proving his point.

Nevertheless, Epstein's trenchant analysis and lucid storytelling style illuminate crucial aspects of the future of work and success in the contemporary world. Increasingly, even for us mere mortals, generalization will become not only the norm but the only surefire path to professional success. As automation continues its inexorable march into specialized realms long considered impregnable to robotic incursion, from law to medicine to accounting and even to chess, only those capable of *bridging* those realms will thrive. Specialists, Epstein contends, are "still absolutely critical, it's just that their work is widely accessible, so fewer suffice." Detailed technical knowledge is becoming freely, widely, and instantaneously available to one and all at any time of day, and specialists who remain mired exclusively in their own discipline will enjoy only a limited shelf life. According to "The Future of Jobs," a 2016 World Economic Forum report Jerry Useem cites, "nearly 50 percent of the subject knowledge acquired during the first year of a four-year technical degree [will be] outdated by the time students graduate." Knowing lots of stuff simply

no longer suffices to succeed in the contemporary professional world.

As a lawyer, I find myself especially attracted to Epstein's generalization thesis. (I am cognizant of now falling prey to his tendency of overvaluing anecdotes.) The legal profession has begun to lose its immunity to the automation virus, with one Silicon Valley startup last year raising $65 million to apply machine learning to document processing and other repetitive legal tasks. While far more specialized than Epstein himself, my own foxy professional interests range broadly, and more often than not I apply to my law practice skills and insights I learned by thumbing through the sports pages in search of obscure basketball statistics (like the importance of recognizing variance in outcomes), by opining for my think tank (how to weigh competing public policy concerns), by writing book reviews (extracting, examining, and evaluating an author's strongest arguments), by studying Jewish texts (logical analysis and historical precedents), or even by solving number or crossword puzzles (flexible thinking and multitasking). I feel most professionally fulfilled and most effective at my day job when I'm able in some measure to take part in all of these activities in the course of a single day.

Similarly, working both in Israel and the United States, in Hebrew and English, to assist Israeli and other international companies with their American legal needs enables me to glean and employ lessons in both contexts. And straddling the worlds of law, engineering, and science as an intellectual property litigator forces me to make connections that others with narrower legal practices may eschew to their own detriment. At least this is what I tell myself to fend off the robot overlords that I know are coming for me and my ilk.

Either way, with wicked environments abounding, the wise among us will embrace Epstein's counsel and nourish our inner foxes. We may soon be unable to afford not to.

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