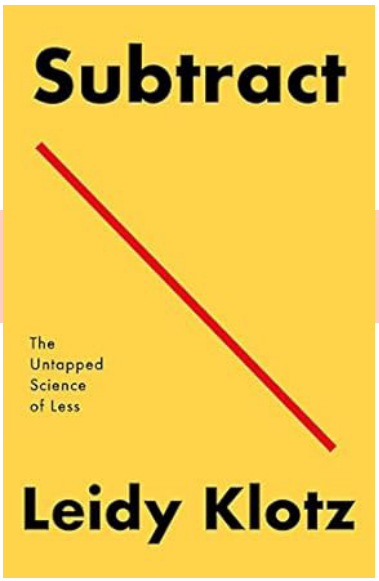

Subtract

By Leidy Klotz • Flatiron Books 2022

ABOUT THE AUTHOR

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The Summary

Introduction

In our striving to improve our lives, our work, and our society, we overwhelmingly add. As we'll see in the pages to come, there are many interwoven reasons for this—cultural, economic, historical, and even biological. As we'll also see, it doesn't have to be this way.

We're all doing essentially the same thing—trying to change things from how they are to how we want them to be. And in this ubiquitous act of change, one option is always to add to what exists, be it objects, ideas, or social systems. Another option is to subtract from what is already there.

The problem is that we neglect subtraction. Compared to changes that add, those that subtract are harder to think of. Even when we do manage to think of it, subtracting can be harder to implement. But we have a choice. We don't have to let this oversight go on taking its toll on our cities, our institutions, and our minds. And, make no mistake, overlooking an entire category of change takes a toll.

Before we examine that evidence, we need to know what we are looking for. Here is the conceptual distinction that advanced my thinking—a few thousand hours of me trying to get somewhere, all condensed into two paragraphs for you:

The breakthrough came when I figured out that what I am interested in is not simplicity, or elegance, or any other form of "less is more." Subtracting is an action. Less is an end state. Sometimes less results from subtraction; other times, less results from not doing anything. There is a world of difference between the two types of less, and it is only by subtraction that we can get to the much rarer and more rewarding type.

In other words, subtraction is the act of getting to less, but it is not the same as doing less. In fact, getting to less often means doing, or at least thinking, more. Removing a freeway is far more challenging than leaving it alone or than not building it in the first place. As my team would find in our studies, mental removal requires more effort too. So, subtractors need not be minimalists, laid-back, anti-technology, or possessed of any other philosophy that owes some of its popularity to its ease. In fact, when we mix up these other philosophies with subtraction, we don't see taking away as an option, and we discount the hard work needed to make it happen.

With my thinking clarified, my team embarked on tens of thousands of hours of research. We experimented, discussed, wrote, presented, and repeated. And we discovered that humans overlook subtraction. People don't think of the other kind of change, even when subtraction is obviously the better option.

Part I: Seeing More

Chapter 1: Overlooking Less

An epiphany in my thinking about less came when Ezra, my son, and I were building a bridge out of Legos. Because the support towers were different heights, we couldn't span them, so I reached behind me to grab a block to add to the shorter tower. As I turned back toward the soon-to-be bridge, three-year-old Ezra was removing a block from the taller tower. My impulse had been to add to the short support, and in that moment, I realized it was wrong: taking away from the tall support was a faster and more efficient way to create a level bridge.

Since I had become a professor, I had been trying to convert my interest in less into something I could study instead of just ponder. From the start, I studied ways that buildings and cities might use less energy—and therefore produce fewer climate-changing emissions. I studied architecture and urban design, the people using it, and the people designing it. Over time, I had honed in on the designers, finding that, even when it leads to suboptimal things, designers use mental shortcuts: anchoring on irrelevant numbers, unthinkingly accepting default choices, and being swayed by examples. Still, I could never quite get from studying buildings and cities to studying less itself.

Ezra's encounter with Legos took my applied thinking about design to a more basic level. Here, right in my living room, was a relatively simple situation that could be changed by adding to it and by taking away from it. And when Ezra's choice caught me by surprise, it made me realize that, whereas less is an end state, subtracting is the act of getting there.

Not only did Ezra's bridge shift my focus from less to subtraction, it gave me a convincing way to share and test my epiphany. So I began carrying around a replica of Ezra's bridge. I tried it out on unsuspecting students who came to meet with me, checking whether they would subtract, like Ezra, or add, like I had. All the students added.

One explanation for what we had seen in our studies nagged at me: perhaps subtraction wasn't as good as addition, subjectively. Maybe people just like Legos with more blocks, essays with more words, and grids with more shaded areas. If the person who added ingredients preferred their soup to have a more complex taste, or if the person who added another museum in

Washington, D.C., preferred packed itineraries, then the adder made the right choice. The adder may not necessarily even prefer the results, they might simply like the act. Maybe we choose adding because we like things better that we have built ourselves—the IKEA effect. Perhaps we choose adding because to take away is to admit that previous additions are sunk costs. Or maybe we choose not to subtract, because we assume that, if something exists, there's a good reason for it. Or because losses loom larger than gains. Sure, getting rid of a wrong theory, an eyesore freeway, or apartheid is not a loss. But it's easy to mistake less for loss.

If we choose to add, for whatever reason, then our interesting phenomenon isn't necessarily a problem. But what if we are not ever considering subtraction? In that case, if we aren't seeing the possibility at all, then we are definitely missing out.

Chapter 2: The Biology of More

In 1959, Harvard University psychologist Robert W. White took a step toward connecting file folders with evolution. In a paper that has been cited more than ten thousand times, White described our "intrinsic need to deal with our environments"—not just for survival but to avoid feeling helpless.

White defined his key idea with one word, competence, meaning how well we feel we are dealing with our world. In 1977, the Stanford University psychologist Albert Bandura extended White's idea, concluding that one way we meet our intrinsic need to feel competent is by successful completion of tasks. Our biological need to deal with our world is also why it feels good to check items off of a list.

Why would our intrinsic need to feel competent work against subtracting? After all, Ezra learns about his world when he takes away Legos just as well as when he adds them. It's true; we can develop competence just as well by subtracting. The problem is that it can be harder to show competence by subtracting.

When we transform things from how they were to how we want them to be, we need proof—to show mates, competitors, and ourselves. No matter how beneficial an act of subtraction is, it's not likely to leave as much evidence of what we've done.

By having participants acquire things while hooked up to machines that show brain activity, neuroscientists have confirmed that food acquisition as well as other types of acquisition activates the same reward system in the brain: the mesolimbocortical pathway. This pathway runs from the outer layer of our brains, the cerebral cortex, which aligns our thoughts and actions with goals; into our midbrain structures that house emotional life; and deep into our ventricle tegmental area, the origin of dopamine pathways.

Because it connects these thinking and feeling parts of our brains, the mesolimbocortical pathway makes it pleasurable to eat. This same reward pathway can also be stimulated by drugs like cocaine and by website designs that keep us clicking and scrolling as we add Facebook friends, battle Twitter trolls, or buy books. For hoarders, even used sticky notes can provide a hit.

Even simple behaviors require coordination between many areas of the brain. That said, finding the role of a specific reward system does confirm just how deep-rooted some of our adding might be. And because our acquiring behavior maps to a key motivation system in our brains, it just might inhibit us from pursuing alternatives—like subtracting. This adding reward system, long helpful for food, is tough to turn off.

Evolution itself is a marvelous model of balancing adding to pass down our genes with natural selection, which does plenty of downsizing. Our modern brains are smaller than Neanderthals', for example, but bet-

ter for us. Sure, the brain centers for language, social behavior, and decision-making (including to envision change) have gotten bigger. But other parts have gotten smaller.

Evolution also works at the level of ecosystems, and one common result is built-in checks on adding. Whether whales and plankton, foxes and rabbits, or humans and common resources, this balance protects constituents from unbridled growth in one species that might bring down the ecosystem—and the offending species with it.

Closer to home, whereas I crowd my shared research folder with needless files and subfolders, our brains have evolved a built-in protection against overloading our mental processing. When we sleep, our brain cells shrink, which leaves space for microglial cells to come in and clean up unused connections between neurons.

Synaptic pruning is the name neuroscientists have given this automated subtracting. Just as fruit trees grow limbs, we grow synaptic connections between the neurons in our brains. Trees that are watered get bigger and stronger, and the more we use our synaptic connections, the bigger and stronger they get. Of course, a thriving fruit tree also requires pruning, so that precious sunlight or water is not wasted on a branch that will not bear fruit. In our brains, the microglial cells are the pruners. They get rid of less useful synaptic connections so that we can devote more energy and space to the other ones.

To make better use of less, we can gain inspiration from nature. At ecosystem, species, and cellular scales, natural selection works with both hands. We may have instincts to add. But we're surrounded by life that has been transformed by both adding and by subtracting.

Chapter 3: The Temple and the City

A cultural tendency to build would be enough to help explain why we neglect subtraction. But as civilizations appeared so did another time-honored kind of more: our material culture. Apparently, the fourteen different styles of sneaker in my closet are an extension of practical variety that let people navigate their new social lives. Material culture helps us live together in big groups, even though our brains evolved in far smaller ones. In a band of hunter-gatherers, everyone could learn one another's traits, skills, and favored cuts of mammoth meat. As civilizations grew this personalized approach became impossible. But humans still needed to make sense of the people around them. Material culture responded to that need.

Instead of trying to keep track of thousands of individuals, humans could lump their neighbors into a more manageable number of categories, based on their clothes, beads, and so on. These physical things made interactions with strangers more predictable, as when you walk into a deli and recognize that the attentive person with the apron and pad of tickets will take your order when you are ready. Or, inversely, how I can walk across campus undercover—no longer a professor—just by donning shorts, a T-shirt, and one of my (fourteen) pairs of sneakers. In both cases, material culture suggests how people should interact even though they have never met.

As with adding to our skylines, there is no doubt that adding to our closets has roots in the beginning of civilization. Again, the question is "Which came first?": whether material culture may have predated and helped spark civilization. A theory now gaining momentum is that hunter-gatherers randomly generated material culture—say, risky hunters wearing mammoth skins and cautious hunters donning rabbit hides. In this example, no longer would each hunter-gatherer need to

memorize the hunting-risk tolerance of everyone else in their band—that could be inferred from dress. Such mental shortcuts based on material culture would have allowed the hunter-gatherers to manage relationships in larger groups. The larger groups, in turn, would have allowed the hunter-gatherers to build monuments and hierarchies, thus growing civilization.

A cultural pull toward monuments and material trappings is counter to subtraction—whether it's Ezra building more Lego towers or me buying him more Legos. All over the world, too, civilizations spurred another engine of adding: writing. People poured their newfound time and energy into this new medium. Writers could keep records of who owed who, which brought more trading. Writers could create transparent and consistent laws, which enabled bigger civilizations. Writers could convey more ideas and convert them into more things.

Writing both showed adding and enabled it, releasing the capacity to accumulate information from the confines of individual minds. Fleeting ideas could now be made to last, extending the time across which one person could share accurately another.

Archaeologists will continue unearthing the origins of civilization, but our science of less doesn't need to wait. There is no question that adding and culture are inseparable. In key ways the earliest civilizations were defined by more. Humans who no longer needed to spend all day searching for food added more things: pyramids, buildings, and clothes. They added social structures and ideas too: laws, religions, writing and math. For people living in a world lacking all these things and ideas, it would have seemed unnatural to subtract them. It would not have been that there was "nothing left to take away," but rather that there was nothing to take away, period.

Sure, cultural evolution subtracted some things. There was less hunting and gathering, but civilization was a project of enlargement, and since modern culture arose from these first civilizations, we all share the heritage of adding at a scale and elaboration which exceeds the requirements of any practical functions.

Cultures born from adding keep adding, which means they crave more. More food, more shelter, and more infrastructure. Professional governments and militaries are eventually needed, which, in turn, require new roads, forts, and defensive walls. These reinforcing needs demand more natural and human resources, and to get them, adding cultures have expanded.

All that said: even as adding built civilization, plenty of people remained suspicious of, or foreclosed to, more. Warnings against too much are a common theme across all the major religious texts. For some sects—Franciscans and Calvinists, Zen Buddhists and Hindu ascetics—spirituality meant active disdain for worldly accumulation. And for most people in premodern independent and interdependent cultures, for a Roman soldier and for a Mayan builder, the only plausible socioeconomic goal was to maintain one's station in life, not advance it.

Being unable or unwilling to pursue more is not the same as seeing the value in less, but it does help keep some adding in check. So even as adding grew culture, the quest for more as we know it had not diffused throughout society. Yet.

Chapter 4: More-ality

In the first half of the 1990s, the sociologist Leslie Perlow discovered some of the first evidence of what we now know is a widespread failure to subtract to-dos. Perlow showed how this failure leads to "time famine," which we can experience at work or on a day trip—whenever we feel like we have too much to do and not enough time to do it.

Perlow first focused on software engineers. By carefully documenting how the engineers used their time while they were at work, Perlow found that they did, indeed, have more to do than time to do it in. She also found that many of their obligations—especially the interactive and social activities—were self-imposed. The software engineers attended time-sink meetings and long group lunches not because they were required to but because they felt it would be socially unacceptable not to.

Not surprisingly, the time famine was damaging the engineers' relationships outside of work. Perlow also found that individual engineers feeling overextended was harmful to group output at work. Time famine is not good for morale, it is not good for relationships, and it is not good for business.

The software engineers are not the only ones in the busy trap. A US. Army War College report finds that army officers have been caught. The time famine is so strong that it forces these upstanding leaders to be dishonest.

In the most galling example from the report, officers have 256 available days in which to fit 297 days of mandatory activities. Yes, you read that right. It is literally impossible for the officers to do all that is required of them. Their decision is not whether to cut corners, it's which corners to cut.

University of British Columbia professor Liz Dunn has found that, when we overlook stop-doings, we not only fail to streamline our schedules, we miss a chance to make ourselves happy. When we add things, we get something tangible to show for it. When we get rid of a to-do, we get an empty spot on our calendars. It's challenging enough to stop-doing when it's free. Spending money to save time is a stop-doing that you have to pay for.

Time, it turns out, is worth the investment. In one of her studies, which was led by her student Ashley Whillans, Dunn decided to see what her team could learn from the shockingly small percentage of people who do spend money to save time. They asked more than six thousand people, from North America and Europe, whether they spent money on time-saving services like cleaning, cooking, and household maintenance. The rare few who did invest in stop-doings reported greater life satisfaction.

Now, my first thought on hearing this was that it made total sense. Of course, people who use time-saving services are going to be more satisfied. These are people who have enough money to pay someone to cook and deliver dinner for them.

But, as the researchers found, it was not about the money. Millionaires who paid to avoid the busy trap tended to be happier than millionaires who did not. And it was the same for people living on minimum wage—happiness found those who used some of their scarce income to improve their schedules. Dunn's team had uncovered a convincing correlation between greater life satisfaction and fewer to-do's.

Investing in stop-doings helps us avoid and relieve the time famine that plagued Leslie Perlow's software engineers and those Army officers with more requirements than days. When the threat of personal time famine and busy traps is not enough, I remember the possibilities—what I could be doing otherwise. I'm now more likely to pay a handyman to come hang pictures and fix the porch railing. This is partly because I'm terrible at home projects, but mostly because those are priceless family hours, especially so long as Ezra wants me to go on bike rides.

Part II: Sharing Less

Chapter 5: Noticeable Less

Whether in writing or building, ideas or things, we all face situations in which it is easiest or most practical to leave well enough alone. Herbert Simon, who would earn an economics Nobel Prize for his effort, found that the tendency to stop at good enough was widespread. Simon named this tendency "satisficing," a portmanteau of satisfying and sufficing.

As Simon discovered, we satisfice because improvements that are possible in theory can be too hard, not worth the effort, or unnecessary. In those cases, imperfect satisficing makes perfect sense. It is the quickest path to a goal. When grocery shopping, I buy the first jar of pasta sauce I see that does not have meat, costs less than five dollars, and will not obliterate my attempts to keep Ezra's daily sodium intake within the recommended range. Sure, I could spend more time and find a jar that is healthier and costs less, but I have moved on to figuring out which noodles to buy.

Stopping at good enough protects us from wasting effort, but if we are not careful, the same tendency can prevent us from subtracting when the effort would pay off. We are interested in this less beyond more: a post-satisficed less.

Getting to post-satisficed less requires more steps. Then, even if we put in the effort to go beyond good enough, we still face all the familiar anti-less forces, from our tendency to overlook subtraction, to our instincts to add, to a society built on the gospel of more-ality. In other words, extra effort can bring post-satisficed less, but so long as we fail to subtract, extra effort will bring post-satisficed more.

Good writing illustrates this principle. Experts, examples, and research all suggest the same thing: less is objectively better. This was the essence of Ernest Hemingway's confessed practice of taking out parts of his short stories on the "theory that you could omit anything… and the omitted part would strengthen the story." Less is better is what the research data reveals in Daniel Oppenheimer's "Consequences of Erudite Vernacular Utilized Irrespective of Necessity: Problems with Using Long Words Needlessly." And it is hard to make it through college without reading, or at least being assigned to read "Strunk and White." Compiled over decades of teaching English, William Strunk Jr.'s writing guide was updated in 1959 by his former undergraduate student E. B. White. Their resulting book, *The Elements of Style*, still appears on more course syllabi than any other book. Perhaps the most famous Strunk and White advice is their blunt reminder to subtract: "Omit needless words."

There's no shame in getting a second opinion. When we create something it's natural to be attached to the work we've already done. Even if our prior work is irrelevant to the decision at hand, getting rid of it makes us feel like we've wasted the effort used to get there. This is why, when my team asked participants to improve their own writing, they were even less likely to subtract words than when the writing was someone else's.

One of my attempts at noticeable less is on the cover of this book (a yellow page with a downward sloping red line). I hope the downward sloping line reminds you of the persistent subtraction that can take you from satisficed all the way to noticeable less. Because the design is mostly the work of a professional cover designer, I also hope it reminds you that noticeable less often requires asking for help.

We can benefit from help, ideally from someone with little attachment to our prior work, and maybe even someone who is professionally better at finding less. Ernest Hemingway worked with Max Perkins, an editor who also harnessed the brilliance of F. Scott

Fitzgerald, Thomas Wolfe, and Marjorie Kinnan Rawlings. The Strunk and White pairing worked because White was an editor.

Most everything we pay to read benefits from editors finding the less we can't get to on our own. Even after I put every word of this book on trial for its life, an editor read tens of thousands more of my words than you are reading here. I can assure you that your experience is better because I got help.

In 1979, a few months after Herbert Simon received his Nobel Prize for showing that people stop at good enough, Amos Tversky and Daniel Kahneman published a paper demonstrating that we value things we have even more than things we do not. Losing one hundred dollars, Tversky and Kahneman showed, feels more disappointing than gaining one hundred dollars feels satisfying. They called this finding—that the response to losses is stronger than the response to gains—"loss aversion." Loss aversion has gotten a lot of deserved attention, often as exhibit A for behavioral economics.

To study how we value gains and losses differently, Kahneman used brilliantly simple experiments. Like many others, I re-create bits of his studies in my classes.

The simplest version is to randomly give half of the students a physical object that has some value, like a university-branded coffee mug if you want to be true to the original experiment, or a pencil once you have tired of schlepping coffee mugs from the bookstore to class.

After half of the students have received a pencil, I ask them to write down the lowest price for which they would sell it. Those without pencils I ask to write down the highest price they would pay to get one. The sellers tend to price the pencil about twice as high as the buyers. Since the only difference between the two groups of students is whether or not they recently got a pencil, that must explain the difference in how much they think pencils are worth.

Similar loss-averse behavior occurs with other goods and in different populations. Brain imaging confirms that losses and gains stimulate different circuits in our brains.

Those who sell things use our loss aversion to their advantage. Car dealers urge us to take that no-strings-attached test-drive, because the more we feel like we have the car, the more value we assign to it. Amazon.com gave me unlimited free two-day shipping for a year. I wasn't going to pay the annual fee to get the service, but I now pay that same fee not to lose it.

Loss aversion is powerful, widespread, and well publicized. But loss aversion should not excuse our subtraction neglect. The subtraction we are after is an improvement—and improvement is not a loss, even when it comes via less.

Chapter 6: Scaling Subtraction

A checklist for subtraction is in order at this point. We can keep it in our working memory as we move forward—from seeing how subtraction works in systems to using it to transform them. Among the takeaways we are collecting to help us find and share less, this checklist can help us remember the essential steps of doing so.

Subtracting detail before trying to change the system will come first on the list. Persisting to noticeable less (making subtraction visible) is on there too. The other two steps are subtracting first and reusing your subtractions. We can quickly learn and remember them with the help of Jenga and doughnut holes.

In Jenga, the rules promote balance. Jenga forces us to subtract first, requiring that we pull out a block from one

of the lower levels before we add to the top level. Sure, Lego's adding approach has been good for business; but so has Jenga's mandate to subtract first. It was the game's novel subtracting rules that Leslie Scott copyrighted, to the tune of one hundred million copies sold.

It's not just toys telling us that subtracting first can amplify the power of our changes. Project management textbooks remind students and their professors that, when there is a series of changes in which outputs of early ones become inputs to later ones, the early changes tend to be more influential and cost less to make. Catching a flawed toilet handle when it is a drawing is better than finding out after it is installed. Washing hands to keep the catheter site clean saves more lives and costs less than treating infections after the fact. In this same way, subtracting first diverts us from the well-trodden path to more.

So after you have subtracted detail to find the essence of the system you wish to change, consider subtracting first, as in Jenga. Then persist to noticeable less. Last but not least, don't forget that you can reuse your subtractions.

Doughnut holes provide a memorable illustration of this step in the subtracting process. It took a long time for someone to realize that fried dough could be improved by removing from it. The most well-documented story dates the innovation to 1847 and credits a teenager in Maine named Hanson Gregory. Young Hanson asked his mom why her fried cakes were always so soggy in the middle. She said she didn't know. So the teenager took out a fork and punched a hole in couple of the uncooked rounds of dough. His mom fried them. Doughnuts finally had holes.

Removing a ball of dough from the center of the doughnut lets it cook more evenly—and provides more surface area for cinnamon sugar. Less is literally more. Not surprisingly, the post-Gregory years have been good for doughnuts.

It would take more than a century for the holes to turn from functional void to salable solid. As we now know, those little bits of subtracted dough have plenty of appeal on their own. Whether you prefer Dunkin' Donuts Munchkins (1972) or Tim Hortons Timbits (1976), reusing the subtraction has made for another stream of income.

Reusing our subtractions allows us to exploit an advantage of subtracting. When we add to change a system, we are left with the improved system. But when we subtract to improve a system, we are left with the new-and-improved system, plus whatever we have taken away from the old one. What is true in doughnuts is true in consequential changes. When the state of California subtracted $11 billion out of apartheid South Africa, that was $11 billion they could invest elsewhere. Just because a subtracted bit was holding back one system, that doesn't mean it can't be useful somewhere else.

We now have a checklist that gives us room to act and adapt.

- Subtract before improving.
- Make subtracting first.
- Persist to noticeable less.
- Reuse your subtractions.

These four steps can direct our expertise. We can keep the steps in our working memory as we go to work. Let's call them the *lesslist.*

Chapter 7: A Legacy of Less

The Intergovernmental Panel on Climate Change (IPCC) convenes hundreds of scientists, reviewing the work of thousands more, to provide summaries of the science on climate change. One of the IPCC's latest reports runs 167 pages, and those 167 densely packed pages are a synthesis of other syntheses. There is no fat to cut. A

single line in an IPCC report could represent multiple lifetimes' worth of study or action.

Within the goal of maintaining a climate that supports life, there are also countless interdependent issues: changes in the atmosphere, seas, and extreme events; impacts on food and water systems and biodiversity; and projections and proposed paths forward through decision-making, finance, and policy. Each of those sub-issues could have its own report.

One response to a 167-page report that is just the tip of the iceberg is to reassure ourselves that every little bit counts. As long as we do something to improve the situation, it matters. If we can coordinate with others, even better. I think this is nonsense.

We need to prioritize. There simply are not enough human resources to devote to every possible response to climate change. We can't do it all. We need to do what will make the most progress.

Carolina Mauri's ambition is to make progress. Mauri has been instrumental in setting Costa Rica's climate change policy, in multinational agreements, and in her home nation's government. Before trying to improve the system, Mauri took what you now know can be a hidden and hard first step. She subtracted information about the situation itself.

Remember, to subtract information, it needs to be there in the first place. Mauri considered complexity. As an expert on climate change law and policy, Mauri knows that adapting to environmental changes is as important as lessening them. She knows that Costa Rica is just one nation—one herder in the vast climate commons. And she knows that any climate goals had to also consider impacts on poverty reduction, health, and even economic growth.

Mauri considered all of that detail and more. Then she got rid of it to find essence.

Mauri subtracted complexity—and then she subtracted some more. In 2007, Costa Rica announced the essence. They would become the first carbon-neutral country by 2021, the two-hundredth anniversary of their independence from Spain. It's not an easy goal, but it's a useful one.

The 2021 vision guided Costa Rica as they made more granular decisions about budgets, laws, and incentives. Using fossil fuels took Costa Rica away from their 2021 goal, so that activity was taxed. Energy sources that don't emit carbon, including solar, wind, and bio-fuels, were incentivized. Costa Rica may be a relatively small herder in the climate commons, but with pre-action subtraction, they set an example we can learn from as we take on our grand challenge.

Step two on our lesslist is to make subtracting first. The three Rs (Reduce, reuse, recycle) suggest ways to stem the flow of emissions into the atmosphere. If we reduce consumption of fossil fuels, we reduce climate-changing greenhouse gases—of course. We need to do everything we can to stop adding emissions to the atmosphere. We also need to take emissions out, though, which means the three Rs are not enough. If we only use the three Rs, we treat the current level of emissions in the atmosphere as our unbreachable baseline.

When the current situation exceeds planetary boundaries, we need to subtract first. Remove must become the first R. Once Costa Rica honed in on their goal of carbon neutrality, they looked at ways to get there. Obviously, Costa Rica needed to add fewer emissions to the atmosphere. But to have any chance at achieving carbon neutrality by 2021, they needed to avoid thinking of the carbon already in the atmosphere as an unbreachable baseline.

Trees pull carbon dioxide out of the atmosphere. Sure enough, restoring forests is one of the most cost-effective ways to improve the atmosphere. Especially for na-

tions like Costa Rica, which combine a perfect climate for growing lush forests with lots of open space for doing so. Now, we all need to do our own checklists. Reforestation may not be an appropriate change for your nation, city, or backyard, but it is for Costa Rica—and it's not to be overlooked when we subtract first and consider ways to "remove" emissions.

Step three is to persist to noticeable less. Subtraction has a publicity problem. What has been subtracted is no longer visible. People may notice the growing forests, but no one is going to see less carbon dioxide in the atmosphere. The reduced emissions are invisible and the effects are distant.

One way to make invisible and distant changes more noticeable is by imagining what they will look like. In experiments, people who interact with aged images of themselves save more money than those who do not. Extending this idea from saving money to saving earth, the practice of "visioning" rests on the logic that the more clearly we imagine the future we want, the more likely we will make it happen.

Here Costa Rica's goal to be carbon neutral by 2021 does double duty. It is the essence that guides improvements to a complex system, and it is a statement of vision that renders those changes noticeable. The 2021 goal motivates Costa Ricans, and its noticeability inspires others and allows them to copy.

A downside of bold visions is that the bolder they are, the harder they are to realize. And indeed, Costa Rica has moved back its 2021 goal to be among those promising neutrality by 2050. Still, the nation's bold imagination has brought real progress on the path to less: nearly all of its electricity comes from renewable sources; its forests continue to remove carbon; and—in a stop-doing that must become a trend—it has halted oil extraction. All this persisting to noticeable less has earned Costa Rica recognition as the greenest country in the world, which has attracted a new stream of visitors, which is one of the ways the nation is making less pay.

The last step on the lesslist is to reuse our subtractions. As a doughnut hole reminds us, it's worth asking if we can reinvest what we take away. Carbon dioxide pulled out of Costa Rica's atmosphere is turned into forests, thanks to good old photosynthesis. These forests, in turn, draw visitors from all over the world.

The returns on Costa Rica's noticeable less come through handsomely in trees and other biodiversity. But what about the economy? Whereas GDP pushes us to add, other benchmarks can reward subtracting as well. Costa Rica assigns economic value to the carbon removal and storage provided by the nation's forests. Using this modified measure, Costa Rica can put farmers to work growing trees, rather than cutting them down.

Perhaps Costa Ricans are just naive. This is a nation, after all, that got rid of its army in 1949, diverting war funds to education, health, pensions, and even an art museum. Its GDP is around $12,000 per person, whereas the United States' is around $65,000 per person. A less aggressive climate action plan might improve GDP, and a military surely would.

On the other hand, Costa Rica's reprioritized spending has improved literacy and health, to the point where its citizens now live longer lives, on average, than Americans. Maybe there is something to learn from their subtracting.

Chapter 8: From Information to Wisdom

We all know the problem. We talk of information fatigue and overload. We may try information (a.k.a. "tech") diets. When our diets don't work, we may resort to an information purge. The phrase too much information is so common it has earned the acronym TMI, which has

spread from texting into spoken language and even into old-media dictionaries. Ironically, TMI is itself information-dense—packing the same meaning in three keystrokes instead of twenty.

Too much information threatens our mental health, from the persistent frustration of interrupting emails, to the clinical anxiety born from an overload of shopping choices. Too much information endangers the participation required for a functioning democracy; people are inundated with so much content, good and bad, that it's hard to separate the signal from the noise. We can systematically consider the merits of every baby crib mattress, or learn the nuances of every candidates' plan—or frightening lack thereof—for responding to climate change. But we can't do it all.

Whether it is to rebuild society or to manage our in-box, selection requires that we distinguish ephemeral data from information. Most emails caught up in spam filters are clearly data, not information. In other cases, the distinction between data and information depends on the user. For most of my colleagues, an emailed warning to "whoever left their sandwich to grow mold in the break room refrigerator" is obviously just data. Others enjoy the sleuthing. The simplest selection filter is that, if you can't use it, it's definitely not information.

Part of the reason it is so hard to subtract information is because we intuitively focus on the costs for the producer and the benefits for the users, respectively. This is the same two-sided thinking that Lego uses when figuring that they can make the 1,100-piece robot set for forty dollars (producer cost), and that parents will be willing to pay ninety dollars (value of user benefit) for it.

But in Legos and other transactions, the user also incurs costs. For material things, these costs are often negligible compared to what was paid for the good itself. I have to walk outside to recycle the Lego box, which is not my favorite activity, but not a significant cost.

When the transaction is for information, however, most of the cost to the user is not covered in the transaction itself. That's one reason I'm flattered that you have read this far. The cost of creating, collecting, writing, editing, marketing, and distributing the information in this book is one thing. You paid for that when you bought it. But the total cost of using the information also includes the time you've spent reading it. No matter how quickly you read, and whether you value your time at $15, $150, or $1,500 per hour, the value of the time you have invested in this book is worth many times what you paid for it. To harness the benefits of our information privilege, we have to take ownership of the costs—both producer- and user-incurred.

Whether in our bookshelves, in-boxes, or brains, intentional and regular subtraction of information is far better than the alternative. If we don't sleep, which is when our synapses get pruned, our brains get overloaded and slow down. And if we don't consciously select information when we are awake, we end up with pulped classics, anxiety from information overload, and smart professors sending emails about email making professors dumber.

The good news is that when we subtract information from our mental storerooms, our processing speeds up like a computer after closing a memory-intensive program that has been running in the background. Working at full capacity, we can create new knowledge—and perhaps even distill it into wisdom.

Pruning extraneous concepts helped me pass mechanics and then everything else. Filtering less useful information can protect our in-boxes and our bandwidth. That would be plenty, but let's persist with this less. Because if we can learn to subtract wrong ideas, we gain a rare power.

We all use analogies. They are convenient for describing concepts. Analogies can also teach new ideas. When we liken our brains' processing to a computer, or

its pruning to an orchard, we build analogies from familiar things to better comprehend unknown ones. Even better, when we learn by analogy, research has found, what gets extended from one problem to another tends not to be the potentially distracting details but rather the essence. In other words, from the computer analogy, we do not assume our brains have a keypad and a sleek silver case with an Apple or Dell logo etched into them. But we do extend the computer's processing behavior as we comprehend our own brains. Analogies subtract detail to declutter the knowledge before it into our mental models.

In very special cases analogies can help us subtract wrong ideas. In these cases, analogies work because they feel like accommodation, in that they allow us to keep one foot in what we know while we seek new ground with the other. Studies of science learning show that presenting a new idea along with new evidence fails to remove misconceptions. The new idea plus the new evidence cannot overpower the embedded misconception. But if we take the same new idea and support it with an analogy to a valid idea that's already set in the mind, then the misconception becomes vulnerable.

Speaking of new ideas, over the last eight chapters, we have seen the untapped potential of subtracting and the rewards that can come with pursuing it. We have subtracted ideas, with the aid of analogy. We have removed the negative valence around taking away, because less is not a loss. No longer do we think add or subtract, because it should be add *and* subtract, like nature.

Persisting to noticeable less takes more mental steps, but I hope you're convinced that it's worth it. Subtracting can have outsize ripple effects.

Takeaways

Can a page of takeaways really sum up the lessons of an entire book? Isn't that the idea? Here are your takeaways.

Invert: Try less before more. Subtract detail even before you act. Then, once you are ready to make changes, put subtracting first—play Jenga. And remember, just because we now appreciate that less is not a loss, that does not mean that your audience and customers do. So, tell them about this book and, in the meantime, don't "subtract." Instead, clean, carve, and reveal. Add a unit of transformation.

Expand: Think add and subtract. Nature shows us that these are complementary approaches to change. Adding should cue subtracting, not rule it out. Try accessing a different multitude. If you run out of multitudes, hire an editor. And don't forget to zoom out to see the field, because stop-doings and negative numbers are not impossible. Plus, the field is where the tension is, and removing it is the "good" way to change systems. So sure, add diversity, but subtracting racism is the prize.

Distill: Focus in on the people. Strip down to what sparks joy. Decluttering delights, and so does the psychology of optimal experience. Use your innate sense for relative difference. Taking away a mammoth is a bigger transformation than adding one. Embrace complexity, but then strive for the essence. Forget objects, remember forces—and pass mechanics. Subtract information and accumulate wisdom.

Finally, **persist:** Keep subtracting. Can you make less undeniable? Costa Rica made neutrality noticeable. Don't forget that you can reuse your subtractions, like doughnut holes. Subtract stuff to leave a legacy of options.

I sincerely hope that you find yourself turning this book's ideas into better things, whatever they may be for you. I can't wait to show Ezra's little sister the other way to play with Legos.