THE STRAIGHT-A CONSPIRACY

YOUR SECRET GUIDE TO ENDING THE STRESS OF SCHOOL

...AND TOTALLY RULING THE WORLD.

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THE SCIENCE BEHIND THE STRAIGHT-A CONSPIRACY

Congratulations! You've finished *The Straight-A Conspiracy* and you are now ready to take on the world, one assignment at a time! Neurology, psychology, and educational research provide the backbone for our view of education, and so for those of you who are interested, we wanted to give a shout-out to some of our favorite works and provide you with the opportunity to find out more. If there were chapters or ideas in this book that particularly piqued your interest, we encourage you to read on and take your new knowledge to the next level!

Stereotype Threat, Self-Theories, and Learned Helplessness

The goal of the first half of *The Straight-A Conspiracy* is to make students aware of just how many preconceived notions about intelligence they possess and just how damaging those ideas can be. Among psychologists, a large body of work exists on what is called "stereotype threat." Many stereotypes exist related to performance—white men are less athletic, women are bad at math, and African-Americans do less well in school. When test-takers are made to think of themselves in terms of one of those stereotypes, the thought tends to impede their performance to such a degree that they in essence "fulfill" that stereotypical belief. In one particularly telling study, stereotypes caused Asian-American women to do both better and worse in math. When they were primed to think about their gender, the women's math skills suffered relative to those who had not been primed at all; conversely, the women scored higher than the control group on the same test when primed to focus on the fact that they were Asian. The bottom line is that even having a negative stereotype is enough to affect performance for the worse.

Some of the students that we've met have been affected by these generalized stereotypes. But more often, students develop damaging theories about their own specific capabilities, like those that we present in the opening chapter. These "self-theories"—as Stanford psychologist Carol Dweck has termed them—have been shown to make students less motivated, less persistent, and less likely to seek help when they're struggling. Unsurprisingly, students who are less motivated, less persistent, and less likely to seek help tend to get bad grades, which in turn make their original self-theories seem all the more "accurate."

But to really appreciate the power of these academic self-theories, it is important to understand that they are one variety of the much larger field of psychology pioneered by Martin Seligman. In 1967, Seligman and his colleagues conducted an experiment in which dogs were placed in electrified kennels. One group of dogs was free to move, while another was chained in place. Predictably, the dogs that were free to move jumped out of the kennels to avoid being shocked. The other group strained to get away, but couldn't and eventually resigned themselves to being shocked. When those same dogs were subsequently unchained, Seligman's group found that although they now had the ability to jump out of the kennel, they simply lay down and accepted shock after shock. This state is now known as "learned helplessness" and has since been used to explain human behavior in a wide variety of contexts.

Crucially, in humans, this learned helplessness is triggered by how we explain what happens to us. If we view our circumstances as being in our control, we improve them. If we don't, we devote our energies to coming to terms with what we view as an unchangeable reality. What is important to note is that, when the dogs were unchained, they didn't even see the obvious things they could do to improve their situation. In studies of learned helplessness in humans, the same effect is observed. Students who feel like their level of intelligence is out of their control often don't even see that simple actions would allow them to get good grades. However, time and time again, studies have found that shaking students out of their state of "learned helplessness" is as simple as showing them just how much control they do have over how intelligent they become.

Read this: *Mindset* by Carol Dweck, *Learned Optimism* by Martin Seligman. See "Selected References" for further scientific reading on this and all sections.

Training-induced Neuroplasticity

One of the biggest problems in modern education is that people everywhere continue to believe that the brain is a fixed organ with a fixed capacity, despite the fact that in the last forty years, scientists have discovered that the brain is, in fact, incredibly flexible. Research has shown that myelination and increased area of activity are just two of the many ways in which the brain can become better able to perform a task. Training has also been observed to cause the growth of new neurons, the expansion of particular brain structures, and changes in the ways in which neurons interact with each other. It's not only the degree to which the brain can change that is impressive. It is also the speed with which those changes can happen. Amazingly, observable changes in the structure of the brain can happen in as little as five days.

Read this: *The Brain That Changes Itself* by Norman Doidge, *In Search of Memory* by Eric Kandel

The Illusion of Rationality (Heuristics and the Intersection of Emotion and Attention)

An equally massive shift in science has been our understanding of how we make decisions. On a physical level, we now know that structures like the amygdala, which process emotion, have a high level of connectivity with the part of the brain involved in rational thought. But in order to appreciate this on a functional level, it helps to know the story of a patient named Elliot. USC professor of neuroscience Antonio Damasio studied what happened to Elliot after doctors removed a tumor from his brain, and what he found has radically altered our understanding of the role of emotion in making everyday decisions.

Before his operation, Elliot was an upstanding citizen, successful businessman, and happy family man—thanks in no small part to his ability to make good decisions regularly and quickly. That all changed after doctors removed the small section of brain behind his nose. Suddenly, simple decisions proved insoluble. Elliot would spend hours trying to decide what restaurant to go to, only to realize that he'd been weighing his options for so long that lunchtime was over. In other words, the new Elliot could not make a decision. The operation had not affected his cognitive function at all; on an intelligence test, Elliot still scored in the 97th percentile. But then Damasio set up a test to measure Elliot's emotional responses, similar to a lie-detector test. When shown "emotional" images, such as that of a gun or a severed foot, most subjects would have an emotional response that could be measured through physiological signs, such as sweating palms. No matter how many of these pictures Elliot saw, he had no response whatsoever; Elliot had no emotions about anything.

Damasio concluded that Elliot's lack of emotion was the reason for his sudden inability to make good decisions. Most people can tell that they feel like eating a certain food for lunch, or might get a gut feeling about something being "not quite right" when they encounter a shady character. But Elliot couldn't access his "gut" feelings anymore, and so he either had to weigh options endlessly or just make a snap judgment, which often led to disastrous results. Sure enough, in a short period of time, Elliot lost his job and ran up a string of failed business ventures, his wife divorced him, and he had to declare bankruptcy after falling victim to a con man. Most of us would assume that taking emotion out of the equation would help us make better decisions, but that wasn't the case for Elliot at all.

Before scientists studied Elliot and cases like his, emotions were thought to be a mere intruder in the process of rational decision making. However, in recent years, scientists have realized that more often than not, we make emotional decisions that we then retroactively justify to ourselves through reason. In fact, as studies have shown, we are all very good at finding logic to explain all kinds of things about our lives: why our decisions are sound, why we're not at fault when we are in a fight with someone, and why it "makes sense" that we're not good at certain subjects. Psychologists have termed this tendency to believe

that our feelings are facts "naïve realism." As shown in the Emotions chapter of the main text, our emotions often conspire to validate our self-theories. However, it is important to note that in various studies in this area, subjects who were made aware of how naïve realism distorts our view of reality were better able to do something about it. In other words, awareness facilitates progress.

On a more refined level, psychologists and behavioral economists have uncovered that our decision-making relies heavily on shortcuts known as "heuristics." (hyu-RIS-tiks) These shortcuts are generally helpful to our decision-making abilities. For example, doctors have to use mental shortcuts when diagnosing patients in emergency situations, but sometimes those shortcuts can lead to misdiagnoses. Rather than eliminating those shortcuts, people in the medical field work to make them better. In fact, one of the defining characteristics of experts in any field is that they use more effective heuristics than amateurs do. In school, the most easily recognizable heuristic is the way in which students consistently look to their peers' performances to determine how they should be performing—a shortcut which, as we have seen in this book, is not always productive. Much of this book's text—culminating in the chart used in Generation Genius—aims to help students find new, more productive shortcuts to enable them to quickly "diagnose" what is going wrong with their work and subsequently move forward in the best possible way.

Read This: *Thinking, Fast and Slow* by Daniel Kahneman, *Nudge* by Cass R. Sunstein and Richard H. Thaler

Schemas and the Importance of Prior Knowledge

On a test, it's clear that you will be expected to know the facts, and so it makes sense that many students try to simply cram those facts into their heads as quickly as possible. To these students, taking the time to understand the material seems like an unnecessary extra step. In reality, research has now shown that the "extra step" of working to make sense of the material actually saves time. As demonstrated in the chapter about London cabbies, by working to understand the

material, students are digging beyond the surface facts to discover the framework that connects them. The framework may be the chronology of historical events or the causal relationship within a biological process. No matter the subject, taking advantage of the inherent "schemas"—as researchers usually call these frameworks—not only makes it easier to organize and memorize the material when it's new, but it also makes that information easier to retain over the long term.

The scientifically demonstrated contextual nature of human memory is the basis for the assertion in this book that "more is more." Study after study has shown that experts in a given field learn new facts related to their field extremely quickly. That's because they have such a rich context in which to anchor those facts. However, it takes them just as long as it would anyone else to learn new facts in fields unrelated to their field of expertise. This is why minimizing the amount of information you need to study, or relying exclusively on the broad outlines provided by book summaries and study guides is not actually the most effective way to speed up your study time—or to make it memorable.

Read This: *Moonwalking With Einstein* by Joshua Foer

Flow and Quality of Experience

While getting straight-*A*'s might be a goal worth aiming for, it's a hard sell if—as many teenagers assume—it's going to mean being miserable and stressed out. One of the most exciting findings about expert performance centers not on what it takes to acquire expertise but how it feels to acquire expertise. In the final chapter of this book, we mention Mihaly Csikszentmihalyi, who has focused his career on the study of "flow." Flow—also known as being "in the zone"—is the state that we experience when we are totally absorbed in a task. When we are working at something that is at the edge of our current abilities and draws fully on our skills in that area, we all have the experience of self-consciousness dropping away and time seeming to fly by. This is not to say that the work is "easy," but when you're in the zone and experiencing flow, the work is totally engaging and satisfying.

Students are correct to observe that getting straight-*A*'s does involve some anxiety, but they are disregarding the rest of the emotional experience—specifically all of the benefits. As Csikszentmihalyi has found, while top-performing students do experience slightly more anxiety, they also experience less boredom and far more flow. From a purely emotional perspective, being heavily engaged is a better choice. But flow comes with one other major benefit that should be of particular interest to teenagers. Flow has been shown to reduce self-consciousness. Thanks to researchers such as Csikszentmihalyi, the motivation to get great grades doesn't have to be far-distant college or career possibilities; it doesn't even have to be the grades themselves; doing well in school can be about improving the experience you're having right now.

Read This: *Flow* by Mihalyi Csikszentmihalyi

Acquisition of Expertise and the 10,000 Hour Rule

In the thirteenth century, noted scholar Roger Bacon argued that it would take a minimum of thirty to forty years to master the highest level of mathematical knowledge that existed at that time. Today, that level of mathematics is routinely taught to high school juniors. As we advance in any given field over time, we also get better at acquiring and sharing the existing knowledge in that field. That's why the average high school graduate in the twenty-first century is far more advanced than the leading experts of yesteryear.

What this teaches us is that practicing in a smarter way allows you to massively reduce the amount of time required to become an expert. Anders K. Ericsson and his colleagues studied the acquisition of expertise by current top performers in fields as diverse as music, physics, chess and sports; they have found that part of what separates experts from amateurs is about 10,000 hours of practice. However, in their work, the researchers also defined the universal characteristics of exactly what kind of practice it takes in order for those 10,000 hours to pay off. As it turns out, practice doesn't necessarily make perfect, if you're doing the wrong kind of practice.

The right kind of practice, which Ericsson calls "deliberate practice," is most easily understood through the example of classical musicians. For those of us who learned a musical instrument and didn't become the next Yo Yo Ma, practice mostly consisted of stumbling our way through the pieces assigned by the high school band director and using the time-honored technique of playing really softly when you're not totally sure what notes to play and coming in overly strongly when you know a section well. Either way, the primary goal was just to get all the way to the end of the piece. In contrast, performers who become truly excellent practice in a very stop-start way. When they run into difficulty with a particular section, they stop and slow their practice down—sometimes to an excruciatingly slow pace—until they can guarantee that they are practicing the exact notes. As they automate that section, they are able to move more and more quickly, but they do not move on to the next phrase until they are sure the current one is perfect. Musicians on the path to mastery do not spend their time playing the pieces they like or the ones that make them sound good. They spend their time playing scales and exercises and pieces that challenge specific aspects of their technique. Deliberate practice identifies areas of weakness in the most specifically targeted way possible and then develops activities to improve those specific aspects of performance. Fudging your way through pieces that you recognize may be more fun in the short-term, but the long-term benefits of being the best at what you do more than make up for all the self-discipline that deliberate practice requires.

For the purposes of introducing the concept of deliberate practice to teenagers, we have chosen the term "fix-it-focused practice," because fix-it-focused practice puts the student's attention on identifying his or her mistakes. Identifying and fixing mistakes is the most essential part of effective learning—and it's also the part of learning that self-theories make us most likely to avoid. Students who are currently doing their best to avoid their mistakes are generally not emotionally ready to be introduced to all of the vigors of Ericsson's deliberate practice. However, as we have found in case after case, if students can just begin to pay attention to their mistakes—and then engage with them—they will start to see the payoff of that work almost immediately. In time, the way in which they target areas of weakness in their work will become more and more specific, and eventually, they will be practicing just like

the experts do.

Read this: *Outliers* by Malcolm Gladwell, *The Talent Code* by Daniel Coyle

Metacognition

Reviewing these disparate fields, it becomes possible to see that the key to maximizing your efforts in school is metacognition. In every field that we've discussed in this section and in the main text of the book, awareness of your thoughts, perceptions, and actions is the key to overcoming the things that are standing in your way. That the National Academy of Sciences chose to underscore metacognition as a unifying characteristic of effective teaching and learning in their report "How Students Learn" presents hope that a broad-based consensus can be built around this idea. In all of our thousands of hours of tutoring experience, what we have consistently observed is that the vast majority of the stress, frustration, shame, and "whatevering" that happens in school is a result of students' desire to not look at what's really going on—or, more specifically, going wrong—in their work. Stressed-out academic superstars and students who are failing have more in common than they realize. For them, school is a feat of endurance; they both devote a tremendous amount of energy to justifying a less-than-ideal experience rather than using that energy to improve it. The impulses to do well in school and to actually enjoy your life are both totally valid. With metacognition, they no longer work against each other; rather, they complement each other. Doing well generates enjoyment. Enjoyment generates greater engagement, which leads to better performance. By cultivating a deep-seated trust that our students can do well and an understanding that using their mistakes will get them there, we can help our students realize that doing well in school is actually the least stressful and most fun way to spend your teenage years.

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